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The Opening Meeting of the Illuminating Engineering Society

THE opening meeting of the Illuminating Engineering Society, held on October 26th, is dealt with on pp. 315-320. This meeting is customarily devoted to reports of progress and exhibits of novelties in lamps, lighting appliances, instruments, etc., and there was as usual an attractive display of apparatus. The writer presented the usual summary of progress during the vacation, which was followed by the report of the Committee on Progress in Electric Lamps and Lighting Appliances. It is hoped that very shortly a similar review of developments in the field of gas lighting will be arranged. Other papers and discussions proposed for subsequent meetings include such subjects as Domestic Lighting, Floodlighting, The Use of Light as an Aid to Aerial Navigation, Developments in Research on Illumination and Photometry, Problems Met with in Lighting Installations, etc., so that the Society has every prospect of an interesting session. We understand that suggestions for various supplementary informal meetings and visits to places of interest have also been made.

As will be seen from the report of progress during the vacation there has been an unusually great number of events to record. In this country the chief feature has been the ever-growing propaganda on illumination,and the continual increase in interest shown in this subject. References to lighting in the daily and technical press are frequent. Several aspects of illumination and applications of light figured in the address of H.R.H. The Prince of Wales before the British Association, and there have been numerous allusions to the subject at other recent conferences and gatherings. The intentions of the Government in regard to electrical supply, and the general interest they have excited both in technical circles and amongst the public, have helped to call attention to the need for better lighting. Happily, too, these proposals now seem to be affording an opportunity for closer relations between the gas and electrical industries, and there probably never was a time when the conditions showed more friendly relations, in spite of inevitable rivalry, between these two great industries, both of inestimable value to the public and the nation.

In both industries we see a tendency to attach more and more importance to " service " to the consumer—service which involves study of the latest developments in illuminating engineering by those who act as intermediaries between the industries and the public.

This is reflected in the attempts being made to extend the number of well-equipped showrooms available in this country, and in the energetic propaganda on the Lighting of the Home now being conducted by the E.D.A. and E.L.M.A. organizations. In such educational work electrical contractors are in a position to play an important part, and their participation in illuminating engineering is much to be desired, both in their own and the public interests.

It is naturaliy unfortunate that the coal strike should have coincided with all this propaganda work, which required long preparation and was initiated before this protracted crisis could be foreseen. But it should be realized that the results of such educational work are necessarily slow, and their full effect will probably only be seen when the coal strike is a thing of the past, and when demands for more light will be eagerly welcomed and readily met. The coal strike is a temporary disturbance, but the need for better lighting is permanent, and at present the amount of light used in this country (as illustrated by figures for lamps used per capita) is much below that available in some other countries.

The arrival of a period of practical development in illuminating engineering is a natural consequence of the sixteen years of pioneering work that have elapsed since 1908, when the Illuminating Engineering Society was started. But the concentration of effort in this direction should not involve the relaxation of experiment and research and the scientific and impartial discussion of the principles underlying the practical applications of light. Otherwise " illuminating engineering " would lose its distinctive meaning and become associated in the public mind only with the commercial application of methods of illumination. The existence of the Illuminating Engineering Society is a safeguard against such a development. So long as it continues to represent all illuminants and all aspects of illumination, opening its doors alike to the expert and the user of light, and so long as it continues to initiate scientific researches such as those now being conducted by the various committees working under the Department for Scientific and Industrial Research, the B.E.S.A., etc., " illuminating engineering " will be regarded as an art and a science. Its strength lies in the broadness of its aims and the facilities it affords for co-operation between all classes of experts—architects, medical men, inspectors of factories, teachers, etc.—besides those vocationally interested in the commercial exploitation of light. We believe that this view is shared by those in leading positions in the lighting industry, who recognize that the Society, by linking together all these varied activities, can do far more for practical developments than if it degenerated into an assembly of " lighting experts identified with limited applications and without the right to speak for the industry and the community alike."

Illuminating Engineering Abroad

ON p. 325 we give an account of the inaugural luncheon of the Dutch Illuminating Engineering Society, and their visit to the Gesolei (Health) Exhibition at Düsseldorf, in which the writer participated. Further reference to this historic event and to the experiences of the writer when meeting leading authorities on illumination in France and Germany is made in the "Report of Progress during the Vacation" (see pp. 315-317).

With the full resumption of international intercourse it was pleasant to meet again many of those who have taken such an interest in the work of the Illuminating Engineering Society in this country and contributed to many of its past discussions. The methods of our own Society, serving as it does as a link between Europe and the United States, are being still watched with sympathetic attention abroad, and it was gratifying to find that its representative character and wide outlook are approved. Special interest was expressed in the system whereby researches are being undertaken by the Committees working under the Department for Scientific and Industrial Research, the B.E.S.A., etc., results being presented on the platform of the Illuminating Engineering Society.

The addition of Holland to the countries which have formed illuminating engineering societies is a noteworthy event. Readers will recall that we have already published an account of the inaugural meeting last June. The Society is evidently being framed on lines closely resembling those adopted in this country, and has received influential support from leading Government officials, railway engineers, architects, professors, etc., besides those directly associated with the lighting industry. In Germany also a special feature has been made of the co-operation of a number of leading medical men and architects—as illustrated by the joint discussion on daylight illumination summarized in our last number. The re-election of Professor Dr. Wedding (the original President of the German Illuminating Engineering Society) this year is an indication of the appreciation of the scientific and technical aspects of illumination abroad.

All these developments on the scientific side are paralleled by great activity in propaganda work by the various bodies representing electric lighting. In Germany, as already announced, this autumn is being devoted to an intensive campaign on shop-window lighting. Both lines of work can proceed simultaneously, and both are useful. It is, however, clearly necessary that the main principles of illumination advocated should be the same throughout, so that the public may not be confused by contradictory suggestions. This can be readily secured by co-operation between the Illuminating Engineering Society and the other bodies, provided steps are taken at an early stage before conflict in aims develops. Uniformity in this respect is more readily obtained when those who conduct propaganda are themselves fully trained in illuminating engineering. This point has been strongly emphasized abroad, where the "commercial engineer," with adequate training both in technicalities and salesmanship, is a recognized expert.

Such propaganda work has been pursued on a very large scale in the United States with successful results, largely owing to the close relations between supply undertakings and manufacturing concerns. But, as the series of paper read at the Twentieth Anniversary Convention of the American Illuminating Engineering Society shows, other aspects have not been neglected. In the present issue we are commencing a summary of the Report of Progress presented at this Convention, and we hope in the future to be able to present regular information on the proceedings of all the illuminating engineering societies abroad, where complete illustrated data on lighting installations, etc., seems to be more readily forthcoming.

The "Efficiency" of Lighting Installations

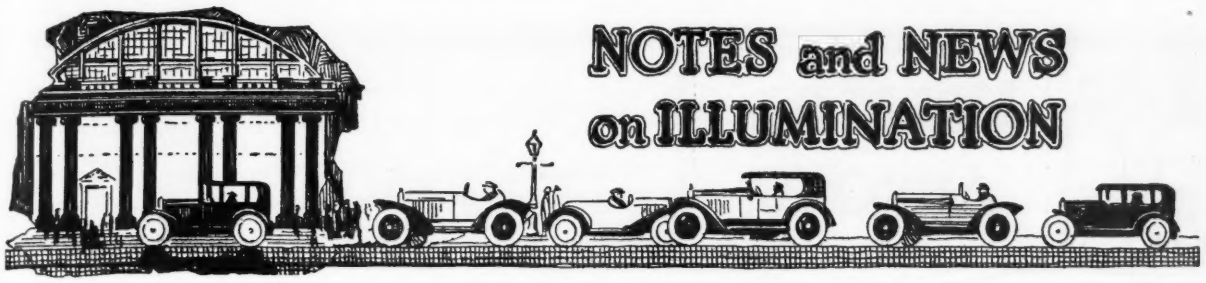
WE summarize in this issue (p. 324) a thoughtful contribution by Dr. N. A. Halbertsma, the secretary of the newly formed Illuminating Engineering Society in Holland, discussing the meaning of "efficiency" as applied to lighting installations. In the early stages of illuminating engineering, when we were learning to apply instruments for measuring illumination, it was natural that considerable attention should be paid to efficiency, and that the differences between appliances which absorbed a great deal of light and those that directed it with comparatively little loss should be emphasized. This principle—the proper direction and diffusion of light without undue loss by absorption—still remains important to-day. But at the same time fuller knowledge has added to our conception of what is meant by the term "efficiency."

In the recent discussion on the B.E.S.A. Standard Specification for industrial lighting reflectors this point was clearly illustrated. It was pointed out that a reflector with a relatively large angle of cut-off (i.e., one which is relatively effective in screening the source from the eyes of the workers) might be less "efficient," in the narrow sense of the term, than a very shallow reflector, which absorbed little light but quite failed in its function of screening the source.

Dr. Halbertsma mentions other illustrations—the use of isolated opaque reflectors with polished interiors (which are very efficient for the purpose of directing light downwards, but if indiscreetly used would give rise to undesirable contrasts in brightness) and the search for a unit designed to produce absolute uniformity of illumination along a street. In all such cases other factors besides that of theoretical efficiency are involved. Efficiency in the sense of accurate distribution with little absorption is of little service if it is accompanied by glare. The appearance of a lighting unit is often quite as important as its utilitarian qualities. Some experts have contended that the lighting of very important main thoroughfares—"White Way" systems—should be judged mainly in terms of appearance. In interiors of architectural distinction efficiency may often have to give way to decorative effect, and securing a pleasing appearance appearance is often "illuminating engineering" in the true sense, since no effect can be pleasing that is distressing to the eye.

It is largely these considerations that have encouraged the development of the all-enclosed diffusing lighting units which are now becoming so popular. Sometimes this method may occasion additional loss of light, but it affords a potent means of avoiding glare, is favourable to easy cleaning and elimination of effects of dust, and furnishes a good basis for special artistic design.

The tendency in this direction is completely in line with the general trend of illuminating engineering, which is at least as much an "art" as a "science." Fixture designers, whether they recognize it or no, will find that their designs are profoundly modified by physiological and architectural aspects of illumination. The views of medical men and architects are already exercising a marked influence on lighting problems, and there is no doubt that the results of their co-operation will make themselves increasingly evident in the future.



Co-operation Between the Gas and Electrical Industries

A feature of the proceedings in connection with the annual meeting of the Institution of Gas Engineers was the reference made to co-operation with other bodies. Closer relations are being formed with the chemists and fuel technologists. As *The Gas Journal* remarks, "Even the electrical and the gas industries—competitors for business—have much in common as public utility concerns." A notable step was the formation, some months ago, of a joint committee composed of representatives of the Institution of Electrical Engineers and the National Gas Council to consider closer co-operation in promoting capital and fuel economy in the supply of energy derived from coal and other fuels. This step was cordially welcomed in the press of both industries, for example by *The Gas World* and *The Electrical Review*. At the luncheon Sir Charles Morgan (Past President of the Institution of Civil Engineers), who presided, referred to the recent address of the President of the Institution of Electrical Engineers, in which the existence of opportunities for both gas and electricity was freely recognized. In some places there was nothing equivalent to gas, while in other places there was a proper field for electricity. That being so, if it were only possible to come to some reasonable solution of the merits and demerits of both systems, then in most cases gas and electricity supply ought to be in the same hands. Mr. D. Madden (Vice-President of the Institution of Gas Engineers), in proposing the toast of "Kindred Associations," likewise referred to the opportunities for co-operation between gas and electrical engineers, and remarked that the antagonism formerly existing had now been largely dispelled by the Electricity Bill which was before Parliament. Mr. C. P. Sparks (Past President of the Institution of Electrical Engineers), in responding to the toast, said that there was a field for both industries, and that it was necessary to curb those very hot spirits on each side who said either that everything must be done by gas or that everything must be done by electricity. Personally, he took the middle course, and believed that there was room for both.

The History of Artificial Lighting

Capt. W. J. Liberty's paper on the above subject before the Society of Engineers on October 4th was illustrated by many lantern slides of early tinder boxes, rush-holders, candlesticks, etc., and comprised an instructive review of primitive methods of illumination. The use of fire sticks in Australia was observed by Captain Cook in 1770, but it is chiefly from the East that we have obtained relics of early forms of lamps. In the Guildhall Museum there is a collection of Roman lamps obtained from excavations in London. Cressets, rushlights, crusies and candles were dealt with in turn. The old watchman's cry ("A light here, maids, hang out your lights," etc.) has been several times recalled in this journal, but another rhyme quoted by Mr. Liberty about "Alderman White and his forty-five dozen of candle" is new to us. Mr. Liberty gave an amusing account of the difficulties experienced in getting the citizens of London to exhibit candles and keep them lighted, and traced the gradual substitution of public for private street lighting. At this period the preservation of order and hindrance of robbery was the chief object of street lighting. The latter part of the address dealt with the coming of gas lighting and the rivalry of the various competing companies until the ultimate introduction of the incandescent mantle revolutionized gas lighting.

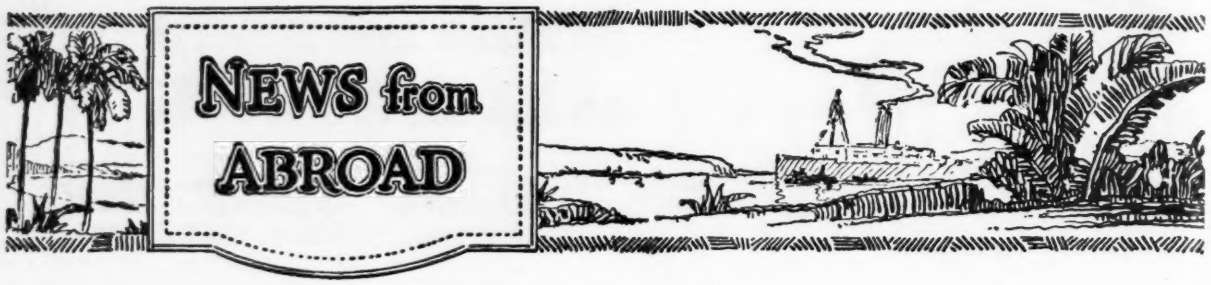
The Prevalence of Myopia in Certain Industrial Occupations

Those who are interested in tracing the relation between inadequate illumination and visual defects would do well to consider the many varied factors that enter into this problem, rendering careful analysis essential. An instance is afforded by a contribution by Dr. Edridge Green to the *Franco-British Medical Review*. Recruiting during the Great War enabled an exceptional amount of information to be obtained, and showed that myopia was very common among the working classes. Experience made it evident that carters—persons who, although in other respects following an almost sedentary occupation, are required to lift heavy weights—are amongst the most myopic of the community. Such men frequently declared that their sight had been good until they became carters and were compelled to lift weights habitually. There were also some who expressed their conviction that they would have to give up their occupation, since their vision had failed to such a degree as to prevent their seeing the names of streets or where they were going. Dr. Edridge Green showed that the myopia was due to intermittent increases in ocular pressure. In some cases abstention from the special efforts responsible for this condition led to a considerable improvement in vision. Special care should be taken by teachers to avoid exercises which are found to produce a sensation of pain and tension in the eyes. This is only one example of special-occupation causes of short sight which have to be eliminated in investigations into the relation between imperfect lighting and deterioration in vision.

Lighting Displays and the Coal Emergency Regulations

The Electricity Department responsible for the "All Electric Exhibition" at Halifax had recently a disconcerting experience, the display being suppressed because the Town Clerk considered that it infringed the Coal Emergency Regulations. Apparently there was no official instruction from the Board of Trade; the step was taken by the local authority on their own initiative. *The Electrical Times*, in commenting on the matter, remarks that those who have recently returned from various popular seaside resorts, where many millions of lamps are in use nightly for display and advertising purposes, are naturally surprised at the severity shown in Halifax. Action in regard to lighting seems to be very variable. In Cardiff there are numerous exhibitions, fairs, dancing halls, etc., which are allowed to carry on, yet occasionally traders have been prosecuted and fined for lighting their windows during business hours. The whole question depends on the interpretation of the clause permitting lighting which is "reasonably requisite" for the carrying-on of business.

Meantime, as our readers are aware, widespread plans involving exhibitions of lamps and lighting appliances in connection with the Better Home Lighting Campaign are being organized. We note that Blackpool had arranged a special scheme of lighting during the present month in which 200,000 coloured lamps had been installed over the three miles of promenade. But this has been greatly curtailed on instructions from the authorities.



Illuminating Engineering in Holland

But a few months ago we were referring to the formation of an Illuminating Engineering Society in Holland.* The Society has been launched with a very representative nucleus of supporters, and is fortunate in having for its secretary Dr. N. A. Halbertsma, who is associated with Philips Lamps Ltd., and has been interested in illuminating engineering for many years. On p. 325 we give an account of an interesting event which occurred last month, the visit of members of the Dutch Illuminating Engineering Society to Dusseldorf, where the celebrated "Gesolei" Exhibition, devoted to hygiene, has been proceeding. As previously mentioned, special attention has been devoted to lighting at this exhibition, under the supervision of Prof. Dr. J. Teichmüller, who was with the Dutch party during their visit. Our Editor, Mr. L. Gaster, also joined the party on the invitation of the Dutch Illuminating Engineering Society, afterwards proceeding to Berlin and Paris, where he had other opportunities of meeting experts on illuminating engineering abroad. It is hoped that this visit will be fruitful in promoting co-operation with the societies concerned with illuminating engineering which are developing in foreign lands, and will enable us to bring before our readers much interesting information on developments in lighting on the Continent.

Spectacular Lighting in the United States

In our last issue we were fortunately able to present a summary of some of the chief papers read at the Convention of the Illuminating Engineering Society in the United States, which marks the completion of twenty years of effort in favour of better lighting. We are now presenting (pp. 321-323) a brief summary of some of the chief points in the "Report of Progress," which is included in the most recent issue of the *Transactions*. We also notice in this issue news of many interesting developments in the lighting art, such as the display of spectacular lighting on the occasion of the "Greater St. Louis" Exhibition. Special illuminations again figured at Salem's Tercentenary Exhibition, and a "festival of lights" was recently organized at Niagara. Evidently in the United States decorative lighting plays a prominent part in civic events.

Another piece of news is the award of a prize of 100 dollars in gold to Mrs. Hearne Adams for most effectively "painting" the "Lady of Light" at the recent N.E.L.A. Convention. This "Lady of Light" was a life-size wax figure, and guests were invited to paint it with coloured light from units manipulated from a dimmer switchboard.

Street Lighting in St. Louis

It is understood that plans are on foot for the initiation of a new "White Way" in the city of St. Louis, which will mark a considerable advance even on the present standard of illumination. Specifications have been prepared for standards 19 ft. in height, each holding two lamps of 1,500 candle-power equipped with alabaster rippled globes and canopies. The standards will be spaced 100 ft. apart on both sides of the street. It will be observed that the use of diffusing glassware is in accordance with American practice in the lighting of main thoroughfares, the idea being that light should be widely distributed, and not unduly concentrated on the road surface.

* *The Illuminating Engineer*, August, 1926, pp. 230-231.

The Regeneration of Electric Incandescent Lamps

We notice in *The Revue Générale de l'Electricité* an account presented by MM. Main et Cie. of processes employed for the regeneration of electric lamps, parts of which have become defective, though they are otherwise sound. Naturally it is only worth while to attempt the regeneration of lamps if the defects are few and easily made good. In some cases the only defect may be a partial failure of the vacuum, which can be remedied, or a breakage of the filament, which can be replaced. After a new filament has been mounted, the interior of the bulb can be chemically cleansed, removing blackening of the bulb. These and other operations are described in detail. In view of the enormous number of lamps in use, and the relatively high cost of the larger types, it may seem singular that the regeneration of defective lamps is so little practised. According to our contemporary, there are probably not a dozen concerns in Europe devoted to this work. The problem is essentially an economic one. The process is only practicable if renewed lamps can be supplied at a price materially below that of a new lamp, and yet offering substantially the same performance in regard to candle-power, consumption and life. There remains the problem of collecting renewable lamps in sufficient quantities. It appears that the process is most likely to be workable in the case of very large users, from whom considerable numbers of lamps can be collected, and to whom the economies of the process are likely to appeal.

Illuminating Engineering Society in Germany

Annual Report

On September 17th the annual meeting of the German Illuminating Engineering Society was held in Essen, but one of the days was devoted to a visit to the "Gesolei" Exhibition in Düsseldorf. The address of the President, Dr. Bloch, expressed great satisfaction with the progress of the Society in spite of all difficulties —progress that was the more gratifying in view of the fact that only six years ago the dissolution of the Society, or at least the relinquishing of its independence, had been contemplated. During the past session twenty-three papers have been presented. A feature has been the development of the two "sister" societies in the Karlsruhe and Rheinland districts. The membership of the German Illuminating Engineering Society has now attained 644, of whom 197 are members of the Rheinland and Westphalia Society and 73 members of the Society located at Karlsruhe. The Society in Austria is also progressing and is working in friendly relations with the German Society. Dr. Bloch also referred to the co-operation of the Illuminating Engineering Society in England which had made frequent reference to papers on illumination read in Germany in their official organ. The Hon Secretary (Mr. L. Gaster), in expressing regret at being unable to be present at the annual meeting, had conveyed good wishes for its success. A specially gratifying step recently initiated had been the restoration of the former conditions enabling German representatives to take part in the work of the International Illumination Commission, the next meetings of which had been provisionally arranged to be held in Rome in 1927 and in the United States in 1928.

TECHNICAL SECTION

COMPRISING

Transactions of The Illuminating Engineering Society and Special Articles

The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

Progress in Illuminating Engineering

(Proceedings at the Opening Meeting of the Illuminating Engineering Society, held at the E.L.M.A. Lighting Service Bureau, 15, Savoy Street, Strand, London, W.C., at 6-30 p.m. on Tuesday, October 26th, 1926.

THE opening meeting of the Illuminating Engineering Society, held at the E.L.M.A. Lighting Service Bureau (15, Savoy Street, Strand, W.C.), on Tuesday, October 26th, was, as usual, devoted to reports of progress and the exhibit of novelties in lamps and lighting appliances, installations, photometric instruments, etc. Mr. J. Y. Fletcher presided.

The minutes of the last meeting having been taken as read, the names of the following applicants for membership were read out by the Hon. Secretary:—

Best, R. D. .....Engineer, 38, Harborne Road, Edgbaston, Birmingham.

Heppenstall, R. J. .....Engineer, "Leycroft," Stapleford, Road, Wembley, London, N.W.

Jervis, A. W. .....Electrician, 91, Lower Sloane Street, London, S.W.1.

Phillips, W. H. .....Acting Chief Inspector of Factories, Bombay Presidency, Old Custom House, Bombay, India.

Simon, H. F. .....Electricity Services Ltd., 27, Martin Lane, London, E.C.4.

Wilson, A. W. .....Electrical Engineer, Messrs. Brooks, Robinson & Co. Ltd., 59-65, Elizabeth Street, Melbourne, Australia.

The names of applicants announced at the last meeting of the Society on June 1st were also read out again, and these gentlemen were formally declared members of the Society.*

Mr. L. Gaster (Hon. Secretary) then proceeded to read the usual review of progress during the vacation, which was as follows:—

A Summary of Progress During the Vacation

By L. GASTER, F.J.I.

It is usual to open the session of the Society by a survey of the chief events that have occurred during the vacation. On this occasion there is an exceptional number of interesting things to record.

In this country the various activities mentioned in papers read in the early part of this year have continued. It is hoped that the introductory report describing the work of the Illumination Research Committee (Department of Scientific and Industrial Research) will be followed in the near future by detailed technical reports on the various researches enumerated in Mr. Walsh's recent paper before the Society.

The equipment of the Home Office Industrial Museum in Westminster which was about to be completed in 1914, but was delayed by the outbreak of war, is now under contemplation. It is understood that in this museum a special feature will be made of the lighting arrangements, and an effort will be made to illustrate typical modern methods of industrial lighting.

Legislation on Factory Lighting.—This prospective development is timely, in view of the fact that the new Factory Bill, now before Parliament, contains provisions requiring sufficient and suitable lighting in factories—a requirement that has not hitherto been actually embodied in the factory legislation of this country, although, as members are well aware, the Home Office has for a number of years taken a keen and sympathetic interest in industrial lighting. The investigations of the Home Office Departmental Committee on Lighting in Factories and Workshops, and the publicity given to them by our Society, have paved the way for this important step, which will no doubt be willingly accepted both by employers and workers as being in their joint interest.

Recent Conferences in England.—There have been, as usual, a number of important conferences during the summer. The I.M.E.A. Conference was held in Glasgow during June 15th-18th, and the first conference of the Electrical Contractors' Association and allied bodies at Brighton during July 23-25. On this occasion no papers dealing specifically with lighting were read at these two gatherings, but there were many points raised in the discussion of considerable interest to this Society, and it is hoped that at future congresses illumination will play a more important part. The British Association meeting at Cambridge this year attracted an exceptional amount of public attention, largely, no doubt, on account of the Presidential Address being delivered by H.R.H. The Prince of Wales. This was in itself a gratifying recognition of the value of science, and the meeting has done a great deal towards impressing on the British public the benefits that applied science can confer. It may be noted that the Prince's address contained several references to illumination, for example to researches being conducted under the Department for Scientific and Industrial Research, and to the possibilities of light in the treatment of disease. This latter aspect—the important functions of the ultra-violet rays in sunlight in relation to health—again figured in the deliberations of the Smoke Abatement Congress held in Birmingham. The economic and hygienic consequences of loss of sunlight through the obscuring effect of smoke-laden atmospheres are of direct interest to illuminating engineers, and in this field representatives of the gas and electrical industries have found a field for their united energies.

Much attention has naturally been devoted to the Government proposals for electrical supply, and it is satisfactory to note that the possibilities of co-operation between the gas and electrical industries in this matter are now being explored by a joint committee, on which both are adequately represented. At the recent annual meeting of the Institution of Gas Engineers, postponed owing to the strike, there were numerous expressions of desire for such co-operation, and at the luncheon sympa-

* *The Illuminating Engineer*, July, 1926, p. 193.

thetic reference to the matter was made by leading gas and electrical engineers.

Propaganda on Better Lighting.—Both industries are directly interested in the organization of efficient showrooms, in which the best methods of lighting can be effectually demonstrated. The number of showrooms suited for lighting demonstrations throughout the country is increasing, but there is doubtless room for extensions on a much greater scale.

Useful propaganda work continues to be done by the E.L.M.A. Lighting Service Bureau, whose work is being continually extended by the creation of provincial centres. These operations are being watched with close interest, and it is hoped that co-operation with the Illuminating Engineering Society will ensure the advocacy of similar principles and methods, so that theory and practice may go hand in hand.

During this winter a combined publicity campaign in favour of better lighting of the home is being conducted by the British Electrical Development Association and the Electric Lamp Manufacturers' Association of Great Britain Ltd., and it is proposed that the next meeting of the Illuminating Engineering Society should be devoted to a discussion on the benefits of good domestic lighting. There is a general feeling that a discussion on this subject on the impartial platform of the Society, aided by articles in its official journal, will be of considerable benefit in impressing the public with the importance of this subject. It is also recognized that the moment is opportune for an examination of the various methods of lighting different types of rooms, with a view to framing general recommendations on domestic lighting. In Germany a corresponding publicity effort is being made in connection with shop-window lighting—a subject which received attention in this country last year.

Public Lighting and Traffic Problems.—The relation of illumination to street traffic problems continues to attract attention. A series of papers on this subject was read at the Conference of the Institution of Public Lighting Engineers in Newcastle-upon-Tyne last September, which was supplemented by an exhibit of lamps and appliances for public lighting, both gas and electric lighting being well represented. This conference, at which the Illuminating Engineering Society was represented by its Hon. Secretary, was useful in providing an opportunity for the exchange of experience between public lighting engineers, and the hospitality of the local authorities assisted in rendering the conference a pleasant event. Amongst the questions raised in the discussion may be mentioned the possibility of a uniform schedule of "lighting hours," the desirability of establishing some basis on which systems of street lighting can be compared and improvements judged, and the lighting of important arterial routes passing through areas served by a number of different authorities. There is a general feeling that ultimately the question of public lighting should become a national duty rather than a parochial one, and meantime it is suggested that the Ministry of Transport might be approached with a view to ascertaining (1) to what extent public lighting falls within the province of the Ministry, and (2) how far it is practicable for the Ministry to initiate experiments and, in conjunction with other bodies, formulate recommendations on which ultimately legislation of the lighting of public highways might be based.

The Formation of the Dutch Illuminating Engineering Society.—On the Continent illuminating engineering continues to receive increased attention. In France, Germany and Austria, lighting bureaux with functions similar to those existing in this country have been established. The Illuminating Engineering Societies in the United States, Japan, Germany and Austria appear to be making good progress, and it is particularly interesting to note the formation of a new body—the Illuminating Engineering Society in Holland. The proceedings at the inaugural meeting of the Dutch Illuminating Engineering Society, held in Amsterdam on June 3rd, have already been recorded in *The Illuminating Engineer.* During October 2nd and 3rd the writer had the pleasure of accepting an invitation from the Dutch Society to join its members in a visit to the well-known "Gesolei" Exhibition, in Düsseldorf, where the party were met by Professor Dr. J. Teichmüller, of Karlsruhe, who is responsible for the organization of the very complete and instructive lighting display at this exhibition. At the inaugural luncheon held at the Rheinterasse Restaurant in Düsseldorf the toast of the Dutch Illuminating Engineering Society was proposed by the writer and seconded by Professor Dr. Teichmüller, and a reference to this historic occasion will appear in the next issue of *The Illuminating Engineer.* The Dutch Society is fortunate in having as its Secretary Dr. N. A: Halbertsma, who has taken an interest in illuminating engineering for many years and to whom thanks are due for the admirable manner in which he organized this interesting and instructive visit. The gathering afforded a valuable opportunity of meeting our friends in the Dutch Illuminating Engineering Society and arranging for future co-operation, and it is interesting to recall that the writer was also privileged to be present at the formation of the Illuminating Engineering Society in Germany, shortly before the outbreak of war.

Illuminating Engineering Abroad.—After the visit to Düsseldorf the writer visited in turn Berlin and Paris, where he had the pleasure of meeting many valued corresponding members of our Society, including Dr. L. Bloch (President of the German Institution of Electrical Engineers and a Past President of the German Illuminating Engineering Society), in Germany, Professor Dr. Wedding, Professor A. Blondel, and many others who have taken a leading part in the development of illuminating engineering abroad. Professor Dr. Wedding, the original President of the German Illuminating Engineering Society, has again been elected to this position, a step which is in accordance with the general desire that the scientific standing of the Society should find expression in the high attainments in this direction of its President.

The writer also received an invitation to attend the annual meeting of the German Illuminating Engineering Society which he was unable to accept, but conveyed greetings from the Illuminating Engineering Society in London. Allusion was made to this in the address of the President, Dr. L. Bloch, who also referred to the part played by *The Illuminating Engineer* in keeping British readers informed of papers on illuminating engineering read in Germany. This feature of the official organ—its function of acting as a link between different countries and as a centre of information derived from all quarters—has been generally appreciated. The arrangement whereby papers read before the various Illuminating Engineering Societies are exchanged should be of great benefit in this respect.

In his address Dr. Bloch also referred to the progress not only of the German Illuminating Engineering Society but of the sister bodies now existing in the Karlsruhe and Rheinland district—progress that is the more gratifying in view of the fact that the Society has passed through a difficult period, and only six years ago its possible dissolution was contemplated in some quarters. In conversations with authorities abroad the writer found everywhere a keen recognition of the growing importance of illuminating engineering. There, as here, the commercial development of the lighting field is being actively pursued, but the view was widely expressed—even by those primarily concerned with commercial aspects—that the success of the movement in all countries is bound up with the existence of well supported and powerful Illuminating Engineering Societies, on which all aspects are represented, and which are able to deal with lighting problems on a scientific and impartial basis. Discussion on this subject has naturally arisen as a result of the general tendency towards commercial application of illuminating engineering. But it is felt that a body which represents only purely technical and commercial lighting interests would be bound to suffer as regards limitation of aims and prestige. In recent gatherings of the German Illuminating Engineering Society architects have taken a prominent part. The keen interest being taken both by architects and physiologists abroad in lighting matters is freely recognized, and their inclusion in the ranks of Illuminating

Engineering Societies is considered very important. Those with the widest experience of illuminating engineering confirmed the view of the writer that the time is not ripe for a purely professional society—a "Society of Illuminating Engineers"—and that the wide scope and representative character of "Illuminating Engineering Societies" should be retained.

Special attention has also been devoted to the training of young men entering upon the practical development of illuminating engineering. It is felt that sound technical training should go hand in hand with salesmanship, and several of the courses in illuminating engineering, notably that organized by Professor Teichmüller in Karlsruhe, are expressly intended for this object.

Progress in the United States.—Progress in the United States was well illustrated by the holding of the Twentieth Anniversary Convention of the American Illuminating Engineering Society, and a message of congratulation was cabled to the President (Dr. M. Luckiesh). The papers read on that occasion were of an exceptionally varied and interesting character, and summaries of some of these have already appeared in *The Illuminating Engineer*, in which an abstract of Mr. Luckiesh's Presidential Address has also been presented. This address contained a lofty exposition of the aims of the Society in the United States which, it may be noted, has not been exempt from the difficulties experienced here. Mr. Luckiesh suggested that the fact that the membership of that Society had been practically stationary for a decade should not be taken as a measure of progress or of public interest in lighting matters. Progress during recent years has been exceptionally rapid, and there are probably more people interested in illuminating engineering to-day than at any other time. The organizing of this latent support demands new methods, to which we must address ourselves from now onwards.

International Aspects of Illumination.—Sufficient has been said to show the opportunities for international co-operation in illuminating engineering, in which this Society, situated between the Continent and the United States, should play an important part. The full resumption of the activities of the International Illumination Commission is already doing much to promote a common basis of action in different countries, and it is especially gratifying to record that difficulties in connection with the participation of ex-enemy countries in the work of the Commission have been removed, so that at the next meeting of the Executive Council, which is expected to be held in Rome next year, the international relations existing before the war will be completely resumed.

The next item was the presentation by Mr. J. Y. Fletcher of the report of the Committee on Progress in Electric Lamps and Lighting Appliances, which was as follows:—

Progress in Electric Lighting

(Report of the Committee on Progress in Electric Lamps and Lighting Appliances. Mr. S. H. Callow (Chairman), Mr. C. W. Sully, Mr. J. W. Elliott (Secretary), Mr. J. Y. Fletcher.)

General.—The past year has been noticeable for the rapid increase in the demand so apparent during the last two or three years by the using public for good lighting in its broadest sense.

This tendency follows the policy of the E.L.M.A. and the Illuminating Engineering Society, to definitely educate the public to:—

(1) What constitutes good lighting.
(2) The drawbacks attending unsatisfactory illumination.
(3) The numerous lamps and lighting appliances which are now available to produce results literally unobtainable up to a few years ago.

The appreciation of the superior lighting efficiency of the gasfilled lamp has naturally led to a great increase in the use of these with beneficial results; their appreciation having been made possible in many positions where previously their high intrinsic brilliancy rendered them unsuitable, by the introduction of lamps with diffusing bulbs, such as the white-sprayed, opal and the internally frosted lamp.

It is even permissible to suggest that in the near future the smaller sizes of gasfilled lamps, such as are used for domestic lighting and for the lighting of small shops, will be accepted only in diffusing bulbs.

The outstanding feature as regards new types of lamps is the introduction of this inside frosted lamp, generally described as "Pearl" or "Purlite." Examples of the lamps may be seen on the platform, and the peculiarly pleasing nature of the light will be noticed.

The loss of light due to the diffusing coating is of the order of 1 to 1½ per cent., never exceeding 2 per cent., and the process is so inexpensive that no increased charge is added to the price of the clear lamp.

The process employed is comparatively simple, but depends for its success on a feature only discovered within the last year or so.

Up to recently, the internal frosting of a bulb, produced by etching with hydrofluoric acid or some similar reagent, resulted in the production of a large number of small irregular crystalline projections on the inner surface of the bulb, which, naturally, weakened the bulb—in some cases to such an extent that the bulb collapsed with its own weight.

The new discovery that has made the process commercially satisfactory is that by a second process of treating with a different solvent the sharp angles produced by the original etching are smoothed off, and the bulb restored to its original strength.

These lamps have been placed on the market in the standard sizes used for domestic and similar illumination, and are meeting with very great approval.

Domestic Lighting.—In domestic lighting the chief features of the year have been:—

(1) The demand for increased light in the home, due to the appreciation that this results in greater comfort, in the lessening of domestic labour and in the avoidance of dirt.
(2) The demand for more artistic lighting by the use of fittings and glassware designed to obtain well distributed and diffused light and the avoidance of glare and the use of unsuitable glassware or fittings.

The artistic demand also extends to the application of coloured lighting in the home, which is to-day easily attained, owing to the existence of colour-sprayed lamps. The appreciation that artistic lighting, whether white or coloured, is really a part of the furnishing of the home is becoming more apparent, and as a result manufacturers are being stimulated to still further efforts to produce appliances to give the required results.

The action of the supply companies and municipal electricity departments in introducing two-part tariffs for homes, which enable electricity to be obtained at very low rates once a fixed charge to cover the "readiness to serve" has been paid, has no doubt contributed largely to the willingness with which domestic users now install comparatively large amounts of light.

As an instance, an average six-roomed house, occupied by from two to four people, which would two or three years ago have been looked upon as lavishly lighted with an installation of 300 watts, will to-day often have four times this amount or even more of lighting installed.

The 30-watt lamp, which was the standard for lighting the house a few years ago, is to-day relegated to cupboards, passages or other little-used positions, while the standard lamp for the sitting-room, dining-room and drawing-room is the 60-watt (or even 100-watt) gasfilled lamp, of which more than one would usually be installed in each room.

Another feature of the up-to-date home installation is the increasing appreciation and use of wall plugs. There is still much to be learnt by the public as to the advantage of installing plenty of wall plugs, which are cheap to install and enable all sorts of helpful lighting devices to be adopted, but 1926 shows definitely that the appreciation is there and is growing.

At this point, mention must be made of the important campaign which is being carried on throughout the whole country by the E.L.M.A., in conjunction with the British Electrical Development Association, which has

for its object the bringing to the notice of millions of people what electric light in the home to-day really means.

There is every indication from the first six weeks' reports that the ultimate results of this campaign in creating a demand for better lighting will be very successful, but the degree of success attained naturally depends on the active co-operation of all who are concerned with its aims and objects.

With this co-operation several million people will be given the opportunity, and will be encouraged, to make themselves acquainted with modern possibilities in home lighting.

Shop Lighting.—In the field of shop lighting there has been no drastic alteration in the actual lamps and appliances used. There has, however, been a very considerable increase in the number of shops which are taking the fullest advantage of the lamps and appliances that have been at their service during the last two or three years.

The survey and campaign of education carried through last year by the E.L.M.A. Lighting Service Bureau has had its effect in demonstrating, first of all, the enormous waste of money and opportunity that arose from the poor lighting in the majority of retail shops, and, secondly, in showing by actual demonstrations what could be done in the way of lighting, not only the windows, but also the interior portions of shops.

The improvement in shop-window lighting is evident to all.

The standard of illumination in windows two years ago would not have exceeded 8 or, possibly, 10 foot-candles. To-day the standard is getting nearer to 50 foot-candles, and in installations, such as a certain shop in Oxford Street, amounts to many times this figure. This arises to a large extent because the manufacturers and others interested in lighting problems have got together, and have evolved the ideal practical method of lighting shop windows. The silvered-glass reflectors, spotlights and floodlights, making up the shop-window lighting equipment to-day, have practically been standardized. The apparatus supplied by the various manufacturers differs only in detail, the results obtainable being of a very similar nature. As a consequence, the shop-owner begins to recognize a standard method of window lighting, and more readily adopts it, as he is not now bothered with utterly conflicting advice from various interested parties.

The standardized system is easy for the window dresser to understand, and it is found that he quickly gets to appreciate the effects that he can produce, and utilizes to the full the colour and other changes that can be used to improve the appearance and attracting power of the goods in the window.

Unfortunately, the coal strike, with the resulting regulations restricting the use of light in windows, has somewhat arrested this development, but many shopkeepers have taken the opportunity to put in new equipment, the results of which will be seen as soon as the restrictions are removed.

Up to the time of the coal strike, the tendency to keep well-lighted shop windows going after dark was rapidly increasing. This, naturally, followed the improvement in the lighting. Here again the restrictions arrested progress, but it is possible to look forward during 1927 to such a large increase in this form of advertising as to forecast that shops in main streets will be brilliantly lighted up at 10 or 11 o'clock every night.

A word here also should be said as to the advance in the use of coloured lighting. With the varied goods shown in the shop windows of the ordinary town there is a tremendous field for the use of discriminating colour, and this is beginning to be appreciated by the expert window dresser as one of his finest tools.

Street Lighting.—Here again the campaign of education as to what good lighting is, and what benefits it brings, has had its effect in moving our civic authorities in the direction of providing a higher standard of illumination in the streets, and in improving the quality of the lighting.

The Association of Public Lighting Engineers is doing good work in exploring the field of street lighting, in investigating the requirements of good street lighting, and, above all, in bringing to the notice of the lighting authorities of the various towns the benefits that good street lighting brings in the prevention of crime and accidents, to say nothing of the convenience and comfort of those who pay the rates and use the streets, which benefits are out of all proportion to the cost of good lighting.

As regards street-lighting equipment, the chief improvement noticed is the increased use of high-powered lamps—1,000 and even 1,500 watt gasfilled—which has become possible through the production of scientifically designed lanterns with accurate directive devices, and with special ventilating arrangements to enable the great heat from these large lamps to be dissipated without at the same time leaving any loophole for moisture to enter.

In London the tendency towards the use of large-power units is specially marked, but several of the provincial centres are following rapidly.

In Sheffield the programme includes the substitution of 1,000-watt for the existing 500-watt lamps.

In Leeds lamps using 500 and 1,000 watts are being installed, and other towns are making trials.

In the principal seaside towns the lighting of the promenade is having considerable attention. Here the problem is to produce good lighting, such as would be needed in the main streets of a town, but to produce this with fittings, pillars, etc., of a somewhat more ornamental nature than would be used in the town.

Good examples of effective lighting carried out with ornamental fittings may be seen at Brighton, Eastbourne, Worthing, Whitley Bay, and, in fact, at most of our first-class seaside resorts.

One of the latest developments in this direction is the introduction of a very attractive pear-shaped unit, for 1,000 or 1,500 watt lamps, equipped with diffusing glassware of such a character that it does not interfere too much with the distribution of the internal refractor, and yet picks up the light in such a manner that it appears as a glowing mass.

This combination of efficiency and decorative qualities can be seen in the new Worthing installation.

For side-street lighting the tendency is now definitely in favour of the use of clear lamps with refractor fittings (so as to obtain the maximum useful illumination from the lower wattages necessary), or gasfilled lamps with diffusing bulbs, these being necessary because in side streets the lamps are usually fixed at a comparatively low level, not more than 14 ft. high, and the essential consideration is to avoid glare in the eyes of motorists.

Train, Tramway, and Omnibus Lighting.—In this important field very considerable development has taken place in the last 12 months. It is at last being realized what a large amount of time the average individual spends either in a train, omnibus or tram. The illumination is, therefore, being brought up to a value to enable reading to be done in comfort.

The movement started with the motor omnibuses, quickly followed by the electric trains. Now trams and steam trains are coming into line.

On the omnibuses gasfilled lamps with diffusing bulbs are being used. In the electric trains the gasfilled 40-watt lamp is rapidly replacing the vacuum lamp of 30 watts, which was considered sufficient last year.

In trams the 40-watt gasfilled lamp is also being adopted steadily, and on steam trains the substitution of gasfilled lamps of 15 and 20 watts for the vacuum lamps previously used is making a marked difference to the illumination results.

Probably the relatively rapid change over in the last year is due to the introduction of gasfilled lamps with diffusing bulbs. It is in lighted moving vehicles almost more than in any other case that the objectionable glare from an unshaded gasfilled lamp is so unpleasant; this is because the lights are invariably right in the line of sight.

It is particularly noticeable at the present time that in many places the standard of lighting in the moving vehicle is higher than the standard of lighting in the surrounding areas. For example, very few railway stations are yet illuminated to the standard of the electric trains on the Southern Railway; very few roads are illuminated with the standard of illumination used in the London omnibuses and some of the London trams. No doubt the near future will see the lighting of railway stations and streets improved so as to approach more nearly to the standard furnished in vehicles.

The production at the end of 1925 of the British Engineering Standards Asssociation Standard Specification for traction and train-lighting lamps, enabling the engineers responsible for the lighting to have definite information as to the results they could obtain, has undoubtedly contributed to the improvement.

Luminous Railway Signalling.—This new development of the use of electric light is one of extreme importance. By the use of electric lamps of various colours controlled by automatic apparatus, which is operated by the moving trains themselves, the speed of signalling on our suburban railways has been greatly increased, so enabling a larger number of trains per hour to be run, to the benefit both of the public and of the railway companies concerned.

These lamps are of the concentrated filament focussing gasfilled type, and have to be made with great accuracy to meet the onerous optical conditions involved.

Somewhat similar methods of signalling, except that they are hand-operated instead of automatic, are being adopted in towns to control the road traffic, enabling the closest possible control to be kept on the traffic in busy streets with the minimum number of human controllers.

The London Suburban Railways form good examples of the results achieved by electrical luminous signalling on railways, while at Dundee an installation is in hand for controlling road traffic. There are several examples in London, also, of luminous control of road traffic.

Decorative and Display Lighting.—Under this heading, which covers the use of electric lighting as a decorative medium pure and simple, there is again very rapid development to be recorded. The subject may be divided into two headings: (1) External; (2) Internal.

Among external lighting may be mentioned the growing increase in the number of buildings floodlighted, generally with white light. The first such installation appeared in this country not more than four years ago. To-day, in London alone, most of the large stores and similar public buildings are floodlighted, and every provincial town of any size has its examples. The actual fittings and lamps used have undergone little change, the apparatus designed some two or three years ago proving entirely adequate, but the skill and artistry displayed in the use of these fittings show considerable advance. Among some of the most recent examples are the Hearts of Oak Office building, Canada House, and several other large public buildings in London, while in the provinces one of the most interesting is the new Electricity Offices of the Swansea Corporation Electricity Department, where the Engineer has taken his own medicine, and has installed a very effective colour-floodlighting installation.

As was suggested a year ago, floodlighting utilizing coloured light is coming into prominence. The beautiful installation of coloured floodlighting on the Pavilion at Brighton, which was carried out for the I.M.E.A. Convention in 1925, was repeated with improvements for the meeting of the E.C.A. at Brighton this year, and was certainly a striking demonstration of what can be done in this direction.

The use of coloured lamps for outlining buildings and gardens is also progressing.

The principles of illuminating engineering are to-day applied to such installations, and the mere strings of lamps of all sorts of different colours, arranged without any particular regard to form or effect, are now replaced by schemes where definite colours are chosen as blending correctly, and are applied on artistic lines so as to bring into prominence the architectural or other features of the buildings and spaces so decorated.

What would have been the finest example of this kind of work ever seen in this country was, unfortunately, interfered with by the lighting restrictions. We refer to what has come to be known as the Illumination Week at Blackpool, where upwards of 250,000 lamps had been installed in accordance with a carefully thought-out scheme. The lighting was only permitted for one night and a portion of another night, but the one night was sufficient to show what a magnificent effect had been created.

Internal Decorative Lighting.—Here again the present-day facilities for obtaining and controlling coloured light are being taken advantage of. The installation of banks of coloured lights controlled by dimmers to illuminate the ceilings of theatres and cinema palaces has now become a recognized feature in all new buildings of this type. Waves of contrasting and blending colours are sent over the whole area of the ceiling or over selected portions of it, as what one may call "The Illumination Interlude" in the same way as the orchestra gives musical interludes between the pictures.

The full possibilities of this class of work have not yet been reached. It brings into play the best abilities of architects, illuminating engineers, and artists. The new Gallery Cinema, Capitol, and many others, will probably be familiar to all those present.

School Lighting.— This subject, which has frequently had the attention of the Illuminating Engineering Society, has now begun to interest the educational authorities, and here, as in other fields, the introduction of gasfilled lamps with diffusing bulbs has given the illuminating engineer his cue. To mention one instance —the Sheffield Educational Authority have re-illuminated no less than five of their schools, putting in complete and up-to-date installations which are giving the utmost satisfaction. Educational authorities in Glasgow, Lancashire, and in London are also studying the best way to light their schools in the interests of the scholars, and abandoning the former practice of putting in the cheapest possible installation without regard to the very special requirements of children and young persons engaged all day in reading or writing.

The recent paper by Dr. Kerr has undoubtedly clarified the position and stimulated the interest of the authorities in this important subject.

Daylight Lamps.—Now that the early and mistaken impression—that the function of daylight lamps was to precisely and exactly imitate daylight—has disappeared, and the true functions of these lamps are being recognized, their use is extending daily. It was unfortunate that the absurdity was not realized earlier of endeavouring to match the colour of daylight, a colour which is not constant for more than half an hour or so at a time.

Daylight lamps, as produced to-day, are designed to filter out a definite proportion of the red and yellow rays emitted from the filament of a gasfilled lamp, and, with this standardized type of lighting, are found of use to assist in rendering the appreciation of the difference between different colours more simple. Many large and important installations using these lamps throughout are now in existence.

As is to be expected, textile and similar mills in the North of England are the chief users, but in other areas it is found that in almost every form of lighting they have their advantages. For example, quite considerable office installations are now carried out entirely with daylight lamps. Basement lighting of shops has become an entirely different matter once the application of daylight lamps was really understood. In distinguishing between different shades of the same colour, as in grading wheat, in sorting leather, sorting coal from dirt, grading flour and other such industries, they are found essential.

Possibly a further fundamental point of illuminating engineering that has also come to be realized recently may have assisted in this development, and that is the fact that if you abstract half your light at the source you must provide more light at the source to produce the same result. Earlier installations were starved.

Church Lighting.—This, although a smaller field than some of the others mentioned, shows the same rapid development, due to the correct application of the science and art of illuminating engineering.

Up to quite recently church lighting was carried out on the lines that were handed down from the days of candles, that is to say, large electroliers or chandeliers were employed each with a myriad of small-powered lamps, so causing a number of dazzling points of light.

To-day church illumination is done, as it should be, by concealed sources of light which, while providing a soft and sufficient illumination to those using the church, also brings out many beautiful architectural features which under the old system of lighting were never seen at all.

Standard floodlighting and shop-window lighting equipment is used with gasfilled lamps which, as they are hidden, are in this case used with clear bulbs.

Industrial and Commercial Lighting.—As far as industrial lighting is concerned, the industrial position has arrested the development which was so apparent last year. Here again, however, it can be recorded that the lighting equipment required for lighting factories has now become standardized, and, in fact, the British Engineering Standards Association have produced a specification for the industrial fitting which alone need be employed.

The standard of illumination is still rising, although this is slow.

The new Factory Act, if it becomes law, will undoubtedly have a material effect in compelling the owners of factories to give more thought to this important question than they are in the habit of doing usually.

Commercial Lighting.—The lighting of offices and the interior of shops is specially noticeable for the rapid adoption of the dust-proof type of electric fitting. This has all the advantages from the point of view of diffusion and distribution of the light of the bowl fitting which it has replaced, and has the considerable additional advantage that the illumination does not deteriorate, due to the accumulation of dust. The somewhat irregular distribution of light on the ceiling is also avoided.

In conclusion, we would like to mention what is in some ways the most revolutionary development of all, and that is the adoption by the Trinity Brethren of incandescent electric lamps as their standard for the illumination of lighthouses and lightships. This is the culmination of many years of experiments to enable a decision to be come to as to the right type of lamp, arrangement of filament, and so on, and also as to what modifications of the lighthouse equipment would be needed to enable the substitution to take place.

As a result, four of the principal lighthouses round the British Isles are being equipped, and two or more lightships, and it is believed that as the result of adopting gasfilled electric lamps it will be possible to materially simplify the working of the lighthouses, and in some cases to enable such lighthouses to operate automatically instead of, as now, to be controlled by men who spend their lives in the lighthouse.

The lamps used are of very great power, the smallest being 3 and 4 kw., while experiments are going on at the present time with lamps taking as much as 10 kw.

The lighting industry can hardly do more for humanity than to assist in the preservation of the lives of those who carry out the arduous and dangerous work of our Navy, both mercantile and combatant.

We shall be dealing in detail with the discussion and exhibits at this meeting in our next number. Mr. Fletcher's report was listened to with great interest, and there was a discussion in which Mr. W. R. Rawlings, Mr. L. Gaster, Capt. W. J. Liberty, Mr. A. Cunnington, Mr. W. G. Raffé, Mr. H. Allpress, and others took part.

Mr. Fletcher having briefly replied to some of the points raised, there was an interval for refreshments, after which the second part of the programme, comprising descriptions of installations and exhibits, took place.

The first item in this section of the programme was a short description by Mr. S. G. ELLIOT of several interesting installations on the Underground Railways, illustrated by lantern slides. The first of these showed a novel method of lighting one of the new subways at Charing Cross Station, and the second the floodlighting of the frontage of one of the tube stations, in a striking manner.

Mr. A. CUNNINGTON (Southern Railways) followed with an illustration showing a method of arranging lamps in a booking-hall and platform in series on 500 volts on an electrified line.

An interesting new form of daylight-factor meter was shown by Mr. H. BUCKLEY, of the National Physical Laboratory, and Mr. H. ALLPRESS exhibited and described the new form of Holophane lumeter, with the test plate on a tripod equipped with an angular scale. (This has been previously described in *The Illuminating Engineer.*)

Mr. L. E. BUCKELL'S exhibit related chiefly to the internally frosted lamps, one striking item being a number of these bulbs arranged in a frame and illuminated from behind by light of changing colour, so as to resemble luminous pearls.

Mr. W. G. RAFFÉ gave a short address on the application of coloured light for the illumination of dancing halls, etc., and Mr. L. C. SHARP (Venner Time Switches Ltd.) exhibited and briefly described a series of interesting forms of time switches for the automatic control of lights.

The new Sheringham Reflector, recently described in this journal, was shown by Mr. G. WHEATLEY. It will be recalled that this reflector has an inner surface painted in a coloured pattern somewhat resembling that used for the Sheringham Daylight Unit, which utilizes the indirect principle, but lighter in tint and of special design. The unit thus furnishes direct light, part emitted direct from the lamp and part by reflection from the inner surface of the reflector.

A new form of spotlighting unit was shown by Mr. L. G. APPLEBEE, and its use was illustrated by lantern slides taken during a performance of "Joan of Arc." Mr. LONG (Metro-Vick Supplies Ltd.) exhibited a series of decorative fittings, and Mr. HUGHES (Siemens and English Electric Lamps Ltd.) likewise exhibited some very pleasing decorative units, a feature of which was the aperture at the base of the glassware, through which a certain amount of direct light is allowed to pass.

After votes of thanks had been passed to the E.L.M.A. Lighting Service Bureau for their hospitality, to the authors and exhibitors, and to Mr. J. Y. Fletcher for presiding, it was announced that the next meeting would be devoted to a discussion on "Domestic Lighting."

The Physical and Optical Society

ANNUAL EXHIBITION, JANUARY, 1927.

We are informed that the Councils of the above Societies have decided again to include in the annual exhibition, in addition to the trade section, a research and experimental section similar to that initiated in January, 1926.

The groups in this section comprise: (*a*) Exhibits illustrating the results of recent physical research and improvements in laboratory practice; (*b*) effective lecture experiments; and (*c*) repetitions of famous historical experiments.

Further particulars of this interesting exhibition may be obtained from the Secretary of the Physical Society at the Imperial College of Science and Technology, South Kensington, S.W.7.

Progress in Illuminating Engineering

A Review of Some Papers read at the Twentieth Anniversary Convention of the Illuminating Engineering Society (U.S.A.)

(Continued from p. 287, October.)

IN our last issue we gave a summary of some of the chief papers read at the above Convention. We have now received a copy of the usual Report of the Committee on Progress. This is a very lengthy contribution, occupying about 120 pages, and we can only single out for notice a few of the salient points.

THE YEAR'S PROGRESS IN ILLUMINATION, 1925-1926.

In a brief introduction attention is drawn to the record of the past year. Illuminating engineering, as an art and a science, has adequately maintained its position as a factor in the world's advancement. The great educational movement towards better lighting is bearing fruit. Another great international exhibition, the Sesqui-Centennial, held in Philadelphia, has been marked by special features in illumination. Progress in England is illustrated by the variety of researches being carried on and the educational work of the service bureaux. Much matter of interest to illuminating engineers was presented at the Optical Convention. Another interesting step has been the introduction of modern methods of illumination in certain cathedrals, which has enabled various ceiling decorations and fine architectural features to be seen by visitors for the first time.

The actual report is divided into 13 sections under the following headings: gas; incandescent lamps; arc and vapour-tube lamps; lamps for projection purposes, street lighting; other exterior illumination; interior illumination; photometry; physics; physiology; illuminating engineering; books and journals.

Gas.—Under this heading a new claim of being the discoverer of gas as an illuminant is mentioned—that of a Belgian, Jean Pierre Minkelers, who is stated to have distilled a small quantity of coal in a barrel in 1783. He subsequently produced gas in large quantities, and used it to light his lecture-room at Louvain University. This year marks the 100th anniversary of the opeinng of the first gas works in Berlin, while last year the anniversary of the invention of the candle was celebrated in Paris. In the United States the total gas produced has increased from 306 billion cubic feet in 1921 to 356 billion cubic feet in 1923—though the number of gas establishments has somewhat diminished. The quantity of gas sold in the British Isles in 1924 showed an increase of more than 15 billion cubic feet over 1923. The total number of gas mantles used in Great Britain in 1924 is given as 62,000,000. In Germany in the same year 45·7 million mantles were produced, as compared with 46·8 million in 1923. Photometric studies have been made of a number of gas burners in Germany, whilst tests in this country have indicated that the flame temperature with 530 B.Th.U. gas is almost invariably higher than that from burning 600 B.Th. U. gas.

Incandescent Electric Lamps.—In the United States the number of sizes and types of lamps has been reduced simultaneously with the introduction of internally frosted lamps; the same procedure is going on in Europe. Attention is drawn to the interesting collection of lamps in the Czechoslovak Technical Museum in Prague.* In 1922 the world consumption of lamps was more than two-thirds of a billion, or three times that in 1911. Of this total over 50 per cent. was used on the North American Continent, 37·6 per cent. in Europe, 7 per cent. in Asia, and 3 per cent. in South America. After the United States, the greatest consumer, countries followed in the order: Germany, Japan, France, Great Britain, Italy, and Russia. The estimated world consumption for 1925 is over 800 million. In the United States the sales of standard tungsten lamps reached 263 million, an increase of only 0·76 per cent. over the figure for the previous year. The consumption of miniature lamps during 1925 reached almost 200 million—an increase of 16 million over figures for 1924. Of these 121·7 million are used for automobile headlights, 29 million for flashlights, 46·1 million for Christmas-tree lighting, and 2·7 million for miscellaneous purposes. In Germany 71·5 million metal-filament lamps were produced in 1924, as compared with 85·7 million in 1923, a drop of 16·5 per cent., attributed to decreased export demand. In Russia the output has increased from 6·5 million in 1923-4 to 10·5 million in 1924-5, and 16·5 million is anticipated for 1925-6.

Reference is next made to various papers dealing with details of manufacture, such as the production, by etching with melted potassium nitrate, of very fine tungsten wires of uniform diameter. Special types of lamps have been produced for projection purposes for tramway work and for traffic signals. Experiments on the life of tungsten lamps have shown that the rate of vaporization of tungsten varies as the 39th power of the temperature.

By focussing a powerful beam of light on the bulb of a gasfilled lamp a scattering effect, during the period following the switching on of the lamp, has been observed. Theoretically the light output of a coiled filament should be 10 per cent. less than that of the same filament uncoiled; but in practice this is not confirmed, owing to other factors, such as variable wire diameter, number of supporting wires, etc. Studies have been made of the ultra-violet radiation from a tungsten ribbon filament mounted in a glass globe with a quartz window. The lowest wavelength recognized changed from 0·34μ at 1,850 to 0·27μ at 2,350. Other tests on the temperature of lamps by thermo-element methods are recorded.

A new wrapper, square in shape and open at both ends, is considered a decided improvement for the packing of incandescent lamps. This makes it convenient to test the lamp, and space for storage is materially reduced. German lamp factories have decided to have all lamps except those having carbon filaments marked with watt consumption in place of candle-power rating. This method has already been customary for gasfilled lamps.

Arc Lamps.—Attention is drawn to the introduction of a new long-burning flame arc (the " Dia " arc already described in this journal), and to various experiments with cored carbons, such that light is derived chiefly from the small body of gas contained within the crater of the positive electrode. These lamps are used mainly for searchlights and for projection and floodlighting purposes. The current density (1·2 amps. per square millimetre) is about four times that in the ordinary arc. Measurements of brightness have given 850 candles per square millimetre at the centre of the crater, indicating a brightness of 715 candles per square millimetre due to the crater gas. Other tests made in Germany have given brightnesses up to 837 candles per square millimetre with 200-amp. arcs using cerium-cored carbons. A 1,000-candle-power direct-current tungsten arc, which derives its light from a combination of the ordinary arc discharge and a glow discharge, has been brought out. This uses a rectangular tungsten anode, 6 mm. by 8 mm., and the cathode is also of tungsten. The arc, mounted in a spherical glass bulb, consumes 400 watts (7·5 amps. on 55 volts), and it is stated to yield 1,000 candle-power (Heffner). Various improved methods of starting the arc, which may be either direct current or alternating current, have been evolved, and the change in candle-power with voltage has been studied. Apparently a change of 1 per cent. in voltage leads to a change of only 0·8 per cent. in candle-power. The spectrum extends to 0·205μ as compared with 0·270μ for the tungsten filament. Designs for a simple form of

* *The Illuminating Engineer*, April, 1926, p. 106.

mercury-vapour lamp for laboratory use have also been worked out, and the conditions in such lamps after the switching on of the current have been closely studied.

Various Special Lamps.—Under this heading special lamps for projection purposes, automobile lamps, traffic control, etc., are described. The American Illuminating Engineering Society, in conjunction with bodies representing motorists, has mapped out a programme for research on headlights. A novel method of dealing with the headlight problem involves only minor changes in equipment. The lens of the right-hand headlight is rotated so as to depress the inside of the beam and raise the outside. A switch cuts out the left-hand headlight when cars are approaching the regular city-driving headlight, furnishing a marker light for the left-hand side of the car. It is said that by this method glare is reduced 50 per cent. Another headlight uses two paraboloid reflectors for each unit, one emitting light through an orange filter, the other through a blue filter. The idea, for its success, requires concerted action on the part of drivers. Whilst driving at night the driver looks through a glass of the same colour as the light he is using. Cars travelling, say, north and east would use the yellow light, cars travelling south and west the blue light. The screen through which the driver looks ahead thus cuts off the light of the opposing headlight of different colour, whilst not appreciably diminishing the power of his own headlight. The apparatus is so constructed that only one of the two colours can be used at once. Other recent devices include the two-filament lamp and the use of an ordinary lamp with the top half colour sprayed, both methods that have been recorded in this journal. The use of presses for the manufacture of parabolic reflectors used in automobile headlights has resulted in considerably improved uniformity.

Traffic Control Lights, etc.—Traffic control systems in various American cities have received much notice. One of the largest systems in the States, if not in the world, is that installed in Cincinnati. Sixty-three street installations are provided with 245-ft. standards of a type similar to that used for boulevard lights, and equipped with hooded signal lamps. The luminous traffic control in Chicago has been expanded by the addition of 49 installations in the Loop district and 87 in the outlying sections. In the United States there has been a large increase in the use of automatic control lanterns mounted over the centre of street intersections or on posts at street corners; similar methods are being tried in Germany. In Paris circular signal lanterns are being used in conjunction with bell signals. One form of unit combines white light for general illumination with an intermittent red warning beacon. Other traffic controllers exhibit the word "go" or "stop" in a distinctive colour. In New York a special equipment of red, green, and yellow lights, operated by push-buttons, and arranged to be carried on the chest, has been devised for the use of police officers as an aid to tower-control.

In addition to increasing applications of floodlighting for railway yards, there has been a marked development in lights used for railway signalling. Improved optical systems have enabled lamps of smaller wattage to be used, the latest development requiring only 5 watts. Methods of intermittent signalling have been introduced in order to save energy. Another interesting development is the use of a searchlight beam to give information to policemen in running down criminals, a system adopted last year in Philadelphia and also in Memphis. Each of a series of stations forming an inner and outer belt of the city will be provided with a searchlight, which will revolve when notice of a crime is received, thus putting all police officers in the district on the alert.

Miscellaneous Developments.—Under this heading reference is made to various advances, such as the use of the mirror projection system in kinematograph projectors. By this means the proportion of the original flux of light actually utilized for the picture is improved, but the heat at the window is much greater than is the case with ordinary lens systems. Thus, in one experiment, it was found that the temperature at the film was almost twice as great for a screen illumination of 20 lux. With higher illuminations, of the order of 40 lux, the ratio in regard to temperature was somewhat less. In recent experiments on a condenser system, making use of a glass parabolic mirror and a 20 cm. diameter condenser of 50 cm. focus, a theoretical loss of 28·6 per cent of the available flux of light was recorded. Reference is also made to the series of papers on moving-picture projection read at the Optical Convention. Much work has also been done on different forms of screens, including those of cloth paint and kalsomine surfaces. Another development noted is the Chromoscope colour-projector, which has been described before the Illuminating Engineering Society and in this journal.

Attention is drawn to the use of miners' electric lamps used either on a 2-volt acid or 2·5-volt alkali battery, which weigh about 1 lb., and should give not less than 1 candle-power. Larger and heavier lamps giving increased light are now coming into use. Electric lamps have been extending rapidly in French mines. One form weighing less than 6 lb. complete is said to give 1½ candle-power for 10 hours. Other developments have been described before the Illuminating Engineering Society (London).

Street Lighting.—The section of the report devoted to this subject is of considerable length. Figures from representative cities in the United States show a steady advance in the amount of light used, as follows:—

Year.	Average Lumens.
1921	1,550
1922	1,700
1923	1,800
1924	2,000
1925	2,100

Progress in street lighting has also been reviewed at the annual meeting of the Illuminating Engineering Society in Germany, which is now advocating 1—2 lux (approximately 0·1—0·2 foot-candles) for light traffic, and 5 to 20 lux for busy streets. Distant control of street lamps has also been arousing considerable attention.

Important installations in a number of American cities are announced. In Everett, Washington, a 53 per cent. in illumination is expected during the next five years. In San Francisco there have also been important developments, one curious item being the adoption of oriental methods—lamp standards in imitation of a bamboo stalk surmounted by a lantern of pagoda design with coloured glass panels. Lamps giving 15,000 lumens are provided. In Los Angeles 203 miles of ornamental street lighting were completed in 1925, as against 84 miles in 1924. It is planned to spend 6,000,000 dollars on ornamental street lighting in 1926. Other examples of decorative lighting in California and on the Western Coast are recorded. In the Middle West a big celebration marked the inauguration of the latest "White Way" system in Salt Lake City. This consists of 28 standards, each equipped with three 1,500 candle-power luminous arcs. In the Central States a new main street-lighting programme is being adopted in St. Louis, while in Chicago many improvements have been executed or are in contemplation. In Detroit the total number of street-lighting units in service is 19,848, an increase of 1,989 since the last report. A notable step has been the introduction of 2,500 candle-power lamps in Cleveland. Parallel developments in the Southern and Eastern States are recorded.

In England statistics on public lighting with gas are noted. It is mentioned that the amount of gas used for street lighting in the last year was 637 million cubic feet in advance of the corresponding figure for 1923. To-day the total candle-power of gas lamps must exceed 50,000,000, as compared with about 8,000,000 in 1900. Reference is made to the papers read at the Conference of the Institution of Public Lighting Engineers, and to new installations in Baker Street (London), Paisley, Bradford, and other cities. Data are quoted on the street lighting of Paris, where the number of electric lamps has increased from 2,440 to over 4,500. In Vienna 90 km. of streets were changed over from gas to electric lighting in 1924 and 150 km. in 1925. Illuminations varying from 0·3 to 1·5 foot-candles are recorded. In Berlin, on the other hand, the number of gas lamps

is being increased. In South America an important piece of street lighting is embodied in the contract for 11,000 lamps for Santiago, Chile.

Other Forms of Exterior Lighting.—There have not been wanting many examples of the application of exterior lighting for other purposes. Every year sees developments in the use of floodlighting for public and private buildings. As a protective measure floodlighting was quite usual during the war. The same idea is now being used for the protection of banks, and as an assistance to those in charge of prisons. The use of outdoor Christmas electric lighting is also extending, as is the use of small Christmas-tree lamps in bushes outside of residences, thus helping to create the holiday atmosphere. Special civic celebrations and exhibitions in the United States are commonly marked by lighting displays, and the recent Sesqui-Centennial Exhibition at Philadelphia was a conspicuous example. San Francisco likewise made use of spectacular lighting on a large scale during its Diamond Jubilee last September. Other instances are to be found in the "Mardi-Gras" Festival at New Orleans, the illumination of the famous Bunker Hill Monument at Charlestown, and the special lighting of Lake Merrit, in Oakland, California.

Floodlighting of Buildings.—A feature has been the application of floodlighting to the frontages of important buildings. An instance in Europe was the floodlighting of the famous old Town Hall in Gouda, Holland, already described in this journal. In the United States a prominent installation has been the floodlighting of the dome of the State Capitol Building at Austin, Texas, which rises to a height of 311 ft. The municipal tower at Springfield, Mass., has likewise been floodlighted. This method has been widely adopted for advertisement lighting, not only by places of entertainment, but by prominent stores and business premises, in which colour effects have played a special part. It is suggested that floodlights should also be applied to the exteriors of central stations—certainly an obvious method of allowing the public to recognize from whence the light proceeds. For utilitarian purposes railways are using floodlights on high towers to illuminate yards; and in one case a 100,000-volt transmission tower has been floodlighted with the object of drawing attention to a bulletin board at its foot. Floodlighting has likewise been applied in the South African Diamond Mines.

In aerial navigation the use of illumination to facilitate night flying has been developing rapidly. It is stated that the first projection unit in the world for aeronautical purposes was set up in England at the Hounslow aerodrome in 1919, whilst at Cranbrook (Kent) and at Croydon there are also special beacons. At Croydon a novel device has been the pillar of neon tubes, switched on for intervals of one second, which has proved an effective signal light. In the United States arrangements have been made for the lighting of the air-mail field at Salt Lake City, and in St. Louis and other places powerful beacons have been installed.

Illuminated Signs.—The number of illuminated signs in use continues to increase rapidly, and it is estimated that during 1925 about 167,000 were erected, the average number of lamps used per sign being 79. In the Manhattan Island district alone the number of signs has increased by 5,000 during the past year; of these more than 2,800 belong to restaurants, 1,300 to barbers' shops, and 1,100 advertise tobacco. Amongst recent developments may be mentioned the design of signs using highly concentrated light, so as to show up in full daylight. Smoke-writing with aeroplanes has become familiar, but the carrying of compact neon signs by aeroplanes for purposes of advertisement is new.

The next section of the report is devoted to interior lighting, after which photometry is very fully dealt with. In conclusion, reference is made to various social researches bearing on biological and other effects of light. With all these we hope to deal in our next number.

(*To be continued.*)

Industrial Fatigue Research Board

SIXTH ANNUAL REPORT.*

The sixth annual report of the Industrial Fatigue Research Board, recently published, contains a full record of researches into conditions affecting ease and efficiency of work, and the removal of drawbacks which handicap and impede the worker. The comparative study of the effects of shifts of equal work, but extending over different periods of the day, and the determination of the influence of "recuperative pauses" in industrial operations are of great interest. Other problems dealt with in researches now being conducted include the causation of accidents, the design of repetitive machinery, the physiology of ventilation, vocational guidance, etc. There are also many specialized problems in certain industries which have come before the Board.

Attention is drawn to the important step taken by the Medical Research Council in appointing a Committee on the Physiology of Vision, under the chairmanship of Sir John Parsons, who is known to our readers as a past President of the Illuminating Engineering Society. Close relations have been established between this Committee and the Department of Scientific and Industrial Research. At the request of the Illumination Research Committee an investigation of the best methods of lighting composing rooms has been conducted, in collaboration with the Joint Industrial Council of the Printing and Allied Trades. A report dealing with the first stages of the investigation is in course of preparation, and it is mentioned that results have so far been very consistent. They suggest that output may increase (and errors diminish) with an illumination up to a limiting value far higher than that commonly found in composing rooms. The requirements of "linking," an exceptionally fine process in the hosiery industry involving close inspection, are also being studied—in particular the use of special magnifying spectacles, with the object of relieving the strain on the muscles of accommodation. Further, an inquiry into the rate of deterioration of vision through fine work, based upon periodical tests of eyesight, has been commenced by Dr. Duke Elder at the London School of Printing, with the active co-operation of the Principal, Mr. J. R. Riddell.

Elsewhere in the report there is a detailed study of the effect of variations in conditions in the textile industries. Researches have shown that under artificial illumination an average diminution of 10 per cent., as compared with daylight, occurs in silk-weaving operations. Confirmatory results have been obtained in other allied textile industries—for example in the weaving of fine linen, where a fall in efficiency of 21·5 per cent. was observed; there was also a marked diminution in efficiency during the hour preceding the adoption of artificial light, when daylight was failing. In cotton weaving a similar relation has been found to exist, the loss in output being in this case 4-6 per cent. Diagrams show the effect on output of diminishing daylight. In these particular experiments owing to short time, artificial light was dispensed with, and work was stopped as soon as daylight was considered inadequate —apparently when the daylight illumination was of the order of 2 foot-candles.

Fog Guides for Ships

PHOSPHORESCENT DIAL THAT TELLS DIRECTION.

There seems no end to the practical applications of wireless in navigation. *The Daily Mail* refers to a striking invention attributed to Dr. Smith Ross, which deserves notice as an interesting novelty. This utilizes a phosphorescent dial with an electronic beam. When a wireless operator tunes into a shore station the beam automatically gives the bearing of the vessel across the dial. The dial itself is placed on the bridge or near the officer in charge, who is enabled to see where he is at a glance.

* Industrial Fatigue Research Board: Sixth Annual Report to December 31st, 1925. Published by His Majesty's Stationery Office; 3s. net.

Some Remarks on "Efficiency" of Illumination*

By N. A. HALBERTSMA

EVER since mankind came to find daylight insufficient, and adopted the use of artificial light, efforts have been made to render artificial lighting more efficient and to diminish the cost. Stimulus to this effort has, perhaps, been afforded by the belief that natural daylight costs nothing. In fact, however, this is not so; leaving out of consideration such payments as the "window-tax," which in olden times was enforced in Holland, it is evident that provision for access of daylight means expense. The space occupied by windows costs more in equipment than the corresponding area of wall surface. In winter, when artificial heat is necessary, more heat is dissipated owing to the existence of the window-glass; and the periodical cleaning of windows is an extra expense. In some buildings provision for access of daylight means considerable extra cost of the original design. In a large building recently erected in Brussels, in which were a concert hall with stage, a swimming-bath, and several flights of stairs in the basement, much less difficulty was experienced in providing fresh air, ventilation and heating than in furnishing light. Ultimately artificial light was used as a substitute for daylight, the similarity being enhanced by the use of windows of diffusing glass, artificially lighted from behind. In many large hotels and similar buildings the use of artificial light proves less expensive than the construction of costly light-wells. Here is a case where, owing to the special circumstances, artificial light is actually more efficient than daylight.

Every cheapening of artificial light leads to an extension of its uses, and, other factors being equal, preference is given to systems yielding the greatest volume of light. It is thus not a fortuitous circumstance that installations are judged primarily by the intensity of illumination provided—indeed there have been times when the value of a system has been judged exclusively by the intensity of illumination. This is illustrated by the large amount of attention given to calculations of intensity of illumination, and especially the determination of theoretical polar curves resulting in "ideal" uniform illumination, in various textbooks issued during the period 1900-1910. Lighting lends itself well to the use of mathematics, but such calculations are only serviceable when the real aims to be attained are kept in mind. An instructive example is to be found in the so-called mirror reflectors, which are in themselves useful additions to our stock of lighting accessories. This form of reflector is efficient in the sense that it performs a radical change in distribution of light, with a relatively small loss. But it is not, on this account alone, a suitable lighting unit for interiors. By dividing the space into equal squares and installing a reflector at the centre of each, so that its flux of light is confined to this square, we could provide illumination of a very high efficiency, i.e., little loss of light—but it does not follow that this system would be the most efficient in the sense that it answers the lighting requirements of the room in the most perfect manner, for a certain cost. On the contrary, the above arrangement would give rise to such sharp shadows that it would be unacceptable for most forms of work, and the same might apply to shop windows. The overlapping of the cones of light from individual units is necessary in order to minimize the sharpness of shadows, and this is a consideration which is not taken into account in the factor "intensity of illumination." It is interesting to observe that enamelled reflectors and white diffusing glassware, which, from a purely technical standpoint, are less efficient than mirror reflectors, nevertheless commonly produce a more pleasing result.

As a further instance of undue insistence on intensity of illumination we may take the efforts made to attain uniformity of illumination in streets. If the ideal of absolute uniformity in interior lighting has a somewhat slender basis, in the case of street lighting it is highly indisputable. Even if it were possible to produce apparent equality of brightness of the roadway, so as to render all objects upon it visible as silhouettes, it would be found that the necessary *illumination* was far from uniform. Intensity of illumination is not the only influential factor. Results are subject to another influence —the direct (polished) reflections of lighting units in the surfaces of the roadway. On asphalt surfaces this effect is very noticeable, especially when it has been highly polished by the continual passage of motor vehicles. But the effect is seen in a lesser degree on other forms of street surfaces. The more congested the traffic and the less the extent of the area of roadway visible, the less will be the influence of such reflections; it is chiefly at times when the street is comparatively empty that its influence becomes visible. The street-lighting problem is only one instance of the great difference between uniform *illumination* and uniform *brightness*—the latter depending largely on the nature of the surface.

Furthermore, it is to be noted that our eyes are much less sensitive to differences in illumination than our bodies are to changes in temperature. We feel comfortable at an absolute temperature of of 290° (270° + 17°), we find 280° and even 283° cold and 298° warm. Our body thus reacts powerfully to changes in temperature of only 2½ per cent.; such a variation in illumination could be perceived by the eye only under specially favourable conditions, e.g., by the aid of a sensitive photometer. Hence, in my opinion, we can be content in practice with photometers having an accuracy very much less than that considered desirable for laboratory measurements. It is much more important to ascertain, with a portable photometer, the order of illumination—i.e., whether 20, 40, 60, 80 or 100 lux, than to be able to tell whether the efficiency of one reflector will result in an increase in illumination of perhaps 5 per cent. Even assuming that by substituting certain reflectors, a 10 per cent. higher illumination would be secured, it does not follow that this would mean 10 per cent. less consumption; for in practice the substitution of the lamp of next lower wattage would probably give not 10 but 30 to 40 per cent. less light.

* Abstract of an article in *Licht und Lampe*.

The Industrial Measurement of Colour

In a contribution to *Building*, Mr. W. G. Raffé points out, as an amazing defect of this commercially scientific age, that we have no national and accepted standard of colour. The "colour cards" issued by various firms have no legal status, and refer to proprietary products. While we can easily cable measurements of any object, we are helpless when we wish verbally to state its exact colour.

The attempts that have been made by various bodies have been based on fallacious grounds. They have tried to produce a set of charts or samples of actual colours; they might be compared to a system based on making numerous rods of all possible lengths, or pots of all capacities. What is actually necessary is not a number of instruments by which to effect measurement, but a unit of measurement. Colour charts which are made of actual samples are instruments and not units. Various optical instruments have been devised, such as the Eastman colorimeter and the Lovibond tintometer. For a national system it would be necessary to amplify standard glasses, such as those used in the latter instrument, until they are available in all the six chief colours for all possible purposes. These, with a Dewey system of numerical classification, would enable the working basis of such a system to be set up.

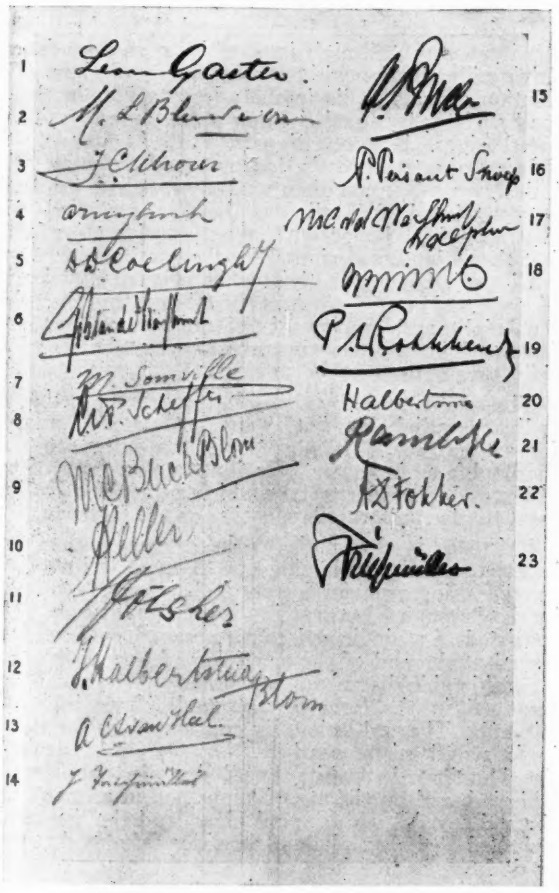
But not only has the positive standard to be set up—there is the equally important problem of the colour of the light which illuminates a coloured surface, without which it cannot be observed at all. It has been suggested that standard colours should be identified under artificial light. Very close imitations of "north light" are provided by lighting units equipped with certain types of "daylight" glass, and it may transpire that eventually some such lamp as this will be chosen as the standard of illumination for colour standards.

Dutch Illuminating Engineering Society

Visit to Düsseldorf and Inaugural Luncheon

AN important event this year has been the formation of the Dutch Illuminating Engineering Society already recorded in this journal.* During Saturday and Sunday (October 1st and 2nd) leading members of the Society, including the President (Professor Dr. Fokker) and the Hon Secretary (Dr. N. A. Halbertsma) paid a visit to Düsseldorf, where the well-known "Gesolei" Exhibition has been held during recent months. This exhibition is devoted to all matters relating to health and a leading feature, which has attracted attention from lighting experts in various countries, was the special exhibit relating to illumination. The arrangement of this section of the exhibition was under the supervision of Professor Dr. J. Teichmüller, of Karlsruhe, who has instituted a special course of illuminating engineering at the technical institute in that city.

On the invitation of Dr. Halbertsma, Mr. L. Gaster joined the party in order to meet friends in the Dutch Illuminating Engineering Society and convey greetings



FACSIMILE OF BACK OF MENU CARD OF LUNCHEON AT THE RHEINTERASSE RESTAURANT INSCRIBED WITH THE NAMES OF THOSE PRESENT (SEE LIST IN OPPOSITE COLUMN).

and good wishes for the future. Professor Dr. J. Teichmüller similarly represented the German Illuminating Engineering Society, and under his able guidance the party had every opportunity of examining the lighting exhibition.

In the course of the proceedings an inaugural luncheon was arranged in the famous Rheinterasse Restaurant, where the lighting and the display of colour effects in the extensive dancing hall was in itself well worth a visit. At this luncheon the toast of the Dutch Illuminating Engineering Society was proposed by Mr. L. Gaster and seconded by Professor Dr. Teichmüller. The menu card reproduced in this column, bearing the signatures of those present, and the group photograph taken by Dr. Halbertsma, are of great historic interest in connection with the starting of this new Illuminating Engineering Society. The list of names shows the representative nature of the gathering and the influential support which the Society is receiving. The visit was most enjoyable, and thanks are due to Dr. Halbertsma for his able organization of the arrangements and to Professor Dr. Teichmüller, who did so much to render the inspection of the lighting section of the Exhibition instructive.

We feel sure that all members of the Illuminating Engineering Society in London will join us in conveying good wishes to the Dutch Illuminating Engineering Society and our hopes that there will be many opportunities for fruitful co-operation between the two bodies.

Here every aspect of illuminating engineering was represented. There were exhibits showing the use of photometric instruments and the applications of principles of illuminating engineering, and the section was so organized as to illustrate the technical, physiological and architectural aspects of the subject.

GROUP OF MEMBERS OF THE DUTCH ILLUMINATING ENGINEERING SOCIETY AND FRIENDS, WITH NAMES READING IN ORDER FROM LEFT TO RIGHT. PHOTO TAKEN BY DR. HALBERTSMA DURING THE VISIT TO DUSSELDORF. THE NUMBER AFTER EACH NAME REFERS TO THE POSITION OF THE CORRESPONDING SIGNATURE ON MENU CARD IN OPPOSITE COLUMN.

Mr. G. B. v.d. Werfhorst (Messrs. Siemens-Schuckert, The Hague), 17; Mr. J. B. Vink (Director of Philips Lamp Co., Brussels), 18; Mrs. Teichmüller, 14; Dr. Persant Snoep (Professor at the Technical School in Leiden), 16; Mr. A. E. Buck (Dikkers & Co., makers of lighting fittings), 15; Professor Dr. J. Teichmüller (Founder of the Lichttechnische Geselschaft and Director of the Lichttechnische Institut in Karlsruhe and Past President of the Illuminating Engineering Society in Germany), 23; Mrs. Buck, 9; Professor Dr. A. D. Fokker (Professor of Physics at the Delft Technical College, and President of the Dutch Illuminating Engineering Society), 22; Mr. Heybroek (Director of Heybroeks Groothandelsgesellschaft, Amsterdam), 4; Mrs. v.d. Werfhorst, 6; Mr. J. C. Schorer (Chairman of the Committee on Illumination of the Dutch Automobile Club), 3; Mrs. Halbertsma, 12; Dr. N. A. Halbertsma (Hon. Secretary of the Dutch Illuminating Engineering Society), 20; Mr. L. Gaster (Hon. Secretary of the Illuminating Engineering Society, London), 1; Mr. J. Keller (Director of Messrs. Keller & Macdonald & Co.), 10; Mr. M. L. Bleuland v. Oordt (Chief Electrical Engineer for the Netherlands Railways), 2; Mr. M. Somville (Philips Research Department, Brussels), 7; Dr. D. Coelingh (Director of Coelinghs Handelsgesellschaft, The Hague), 5; Mr. Höltscher (Assistant to Professor Dr. J. Teichmüller), 11; Mr. P. A. Rothheudt, 19; Mr. Rambke, 21.

Not present when the photo was taken:—Mr. L. S. P. Scheffer (Consulting Engineer on Building Construction, Utrecht), 8; Dr. A. C. S. v. Heel (Assistant in Department of Physics, Delft Technical College), 13.

**Illuminating Engineer*, August, 1926, p. 230.

Sheffield Illumination Society

"The Automatic Control of Street Lighting" was the subject upon which Mr. E. H. Horstmann (Director of the Horstmann Gear Company Ltd.) addressed the members of the Sheffield Illumination Society in the Council-room at the Montgomery Hall, Sheffield, on the 14th October last.

Mr. Horstmann gave a retrospect of the progress made in controlling street lamps automatically, and said that the invention of gas controllers for the automatic operation of street lamps dated back to the year 1867.

From a magazine entitled "Once a Week" and dated 1868 the lecturer gave the following excerpt:—

> "What has the poor lamplighter done that he is threatened with banishment from our highways and byways? Surely, of public servants, he is one of the most active and exemplary. Whoever heard of any of his genus committing a crime, or getting into difficulties, or who has ever had to complain of his execution of his duties? Yet it is designed to exterminate him, and to supersede his office by a clockwork attachment to the taps of our street lamps, which shall turn them full on at stated times every night, and shut them nearly off every morning; the gas being continually kept burning during the day, with a small blue flame, duly protected against extinction by the wind. The inventor of the plan is a Norwich surgeon, Dr. Thurgar. It was discussed at a recent meeting of the Royal Society of Arts, not, however, very favourably, though the advantages of some sort of an automatic lamplighter were fully admitted. The New York papers are just now lauding up an electric invention for the purpose."

A drawing of Dr. Thurgar's instrument was shown on the screen and fully explained, and it was seen that the controller was a clever invention, and contained several of the essential features which should characterize all clockwork gas controllers and electric time switches.

Continuing, Mr. Horstmann said that the advent of the incandescent mantle seemed to have been the signal for the introduction of several types of gas controllers differing from Thurgar's or Gunning's in that they would light the gas instantaneously, as it was found that slow lighting in an upright incandescent mantle was likely to cause lighting back. In 1904 his firm, Messrs. Horstmann, of Bath, being asked for such a mechanism by Mr. Stafford Ellery, of the Bath Gas Company, and without having seen any instruments of this kind before, devised their Type 1 Controller, and it is believed to be the first "quick-lighter" to be put on the market.

Various makes of controllers were brought to the notice of the members, the use of them for lighthouses and furnaces, etc., and the automatic adjustment and interchangeable Horstmann controllers were all very interesting features.

Time did not permit Mr. Horstmann to deal at length with the electric time switches, but much valuable information was supplied to show that they are a big asset to street and shop-window lighting, and that a large range of models with specially designed switches are now available.

Many lantern slides were shown on the screen illustrating the various technicalities, and a number of different kinds of controllers were very kindly exhibited to the members.

Mr. J. F. Colquhoun, Public Lighting Engineer for Sheffield, who presided, thanked Mr. Horstmann for the very interesting and educative paper, and said that Mr. Horstmann was really a part of Sheffield street-lighting system, as many controllers are now in use in Sheffield.

A very hearty vote of thanks concluded a most enjoyable evening.

On page 331 will be found an account of another recent event, the visit of members of the Sheffield Illumination Society to the Sheffield Corporation Sewage Disposal Works on October 2nd.

Arterial Roads and Increased Night Traffic

Adequate, Safe and Scientific Lighting Needed

A copy of *Shepherd's N.E.W.S.*, the road engineering magazine issued from Rochdale, contains interesting particulars of new roads now being developed, and also a brief review of the recent Fifth International Road Congress at Milan and Rome, which was attended by about 2,000 delegates from various part of the world. The writer gives his impressions of Milan, where tramways appear to be constructed under conditions which would be considered dangerous in England. At least one trailer to a tramcar is common, and in Turin up to five vehicles may often be seen linked together on the tramways or light railways. The condition of highways in towns is good, but outside roads are less satisfactory. A feature is the general use of electric lighting derived from the numerous hydro-electric stations in Italy.

The most interesting contribution in the number is that by Mr. Cyril Sylvester, emphasizing the importance of better lighting. It may be assumed that our highways will always be in greater use by day than by night. But the full return for the very large sums being expended in road construction will never be realized until —by adequate lighting—road travel by night has become absolutely safe.

Much research has been expended on headlights, but it appears well-nigh impossible to secure adequate driving illumination without some degree of glare. The solution appears to lie in the adequate illumination of road surfaces by fixed lighting units, aided by illuminated signs, beacons, signals, etc. At present, the lighting of arterial roads does not receive the attention it deserves. One can often see lanterns which originally accommodated fish-tail gas burners equipped with electric gasfilled lamps, without any consideration for the fact that a lantern designed for the one illuminant may not be suitable for another. The efficient illumination of main and arterial roads is something more than this; the height and spacing of the units is an important factor, whilst still more important is the selection of the right type of unit.

The authors point out that lighting units having the ordinary radial distribution are not the best adapted for arterial roads, though doubtless suited to main thoroughfares in towns. He illustrates a form of unit of the multiple reflector type which is capable of adjustment to give uniform illumination on the highway.

Reference is also made to the growing use of road beacons, usually containing one or more lights of distinctive colour, as, for instance, that recently installed by the Borough Electrical Engineer at Maidstone. This consisted of a single red colour sprayed gasfilled lamp placed at the end of the arterial road and visible from a considerable distance; more recently three such lamps, arranged in the form of a triangle, have been substituted. The red colour is considered advantageous in fogs and misty weather. Another useful device is the illuminated "white line" installed at Hendon. This is based on the use of lamps within a strong iron channel covered with ground glass, and the line can be switched on from a pillar at the side of the road as soon as darkness approaches.

Department for Scientific and Industrial Research

We are informed that a licence under Section 20 of the Companies (Consolidation) Act, 1908, has been issued by the Board of Trade to the Research Association of British Paint, Colour and Varnish Manufacturers, which has been approved by the Department of Scientific and Industrial Research as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. The Secretary of this Association is Mr. J. B. Graham, 8, St. Martin's Place, Trafalgar Square, W.C.2.

POPULAR & TRADE SECTION

COMPRISING

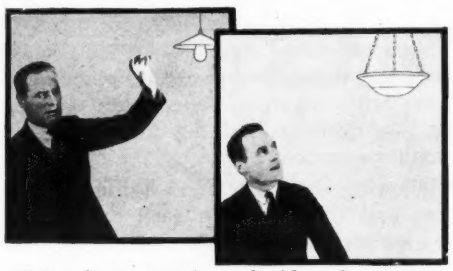
Installation Topics—Hygiene and Safety—Data for Contractors—Hints to Consumers

(The matter in this section does not form part of the official Transactions of the Illuminating Engineering Society; and is based on outside contributions.)

The Lighting of The Home

THE Electric Lamp Manufacturers' Association Lighting Service Bureau has recently published a handbook with the above title. The book confines itself to general and fundamental laws of illumination which are applicable to every home, whether it be the humble cottage or the patrician mansion.

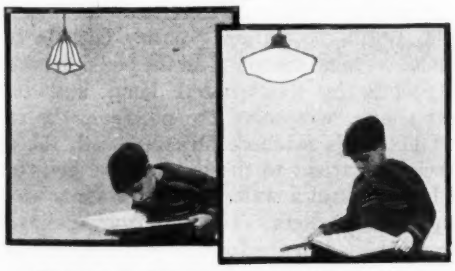
It is pointed out that the home lighting adviser needs more than a knowledge of lighting data which would serve him well when planning an installation in a factory or office, for scientific knowledge cannot be applied to the home without careful discrimination. The element of personal taste is a strong one which will often revolutionize all previous ideas. To combine science and art is the ideal, and it is with this conception that the "lighting artist" will illuminate the home of the future.



Modern lamps must be used with modern fittings to avoid glare.

Present-day culture has made our homes places of beauty, comfort and convenience, but for many hours of home life we are dependent on artificial light to enable us to enjoy these benefits.

Unhappily, many homes of to-day are less than half lighted, according to the reasonable ideals and principles of the present time, and although the rules of good home lighting are simple enough—indeed, largely a matter of common sense—we find the home-owner "spoiling the ship for a ha'porth of tar" and neglecting to make the home as beautiful and comfortable as it might be. The "ha'porth of tar" in this case, when taken to represent the cost of lighting, sinks into insignificance when compared to the cost of furnishing and decorating.



Eyestrain is often caused by insufficient light or presence of glare.

Then there is the consideration of the actual harm done through poor and inadequate illumination. Physicians recognize that lighting conditions play an important part in life, and the eyes are the first members to be injured by a glaring light source or strained through insufficient light.

The evil of glare is only too prevalent in many homes, the most common example being that of a lamp left exposed to the naked eye without any shade to eliminate the brilliance of the modern electric filament. In many cases the householder is unaware that he has poor illumination. To him a "bright" light means a "good" light. This practice of using a bare lamp is the result of a habit acquired when less efficient light sources were available and the elements of good lighting less understood.

It was necessary when using early electric lamps, because of their low intensity, to bring them close to the object to be illuminated and leave them unshaded, but during the last few years their intrinsic brilliancy has increased to such an extent that their proper use is necessary to avoid harmful results. In some homes the modern lamp has been adopted, but it is being used in the same way and in the same fittings as the old types.

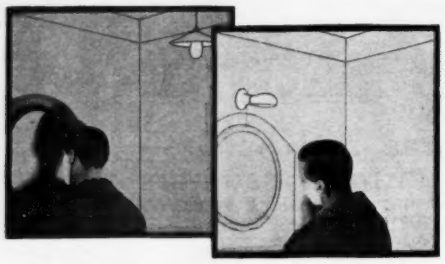
The other cause of eyestrain is due to insufficient light to pursue in comfort the many "close" occupations, such as reading, writing, and sewing. These two evils, glare and gloom, can be abolished in every room in the

A Movable Bracket at the head of the bed makes reading a pleasure.

house if certain simple rules are followed. They are of fundamental importance, and might be considered under three headings:—

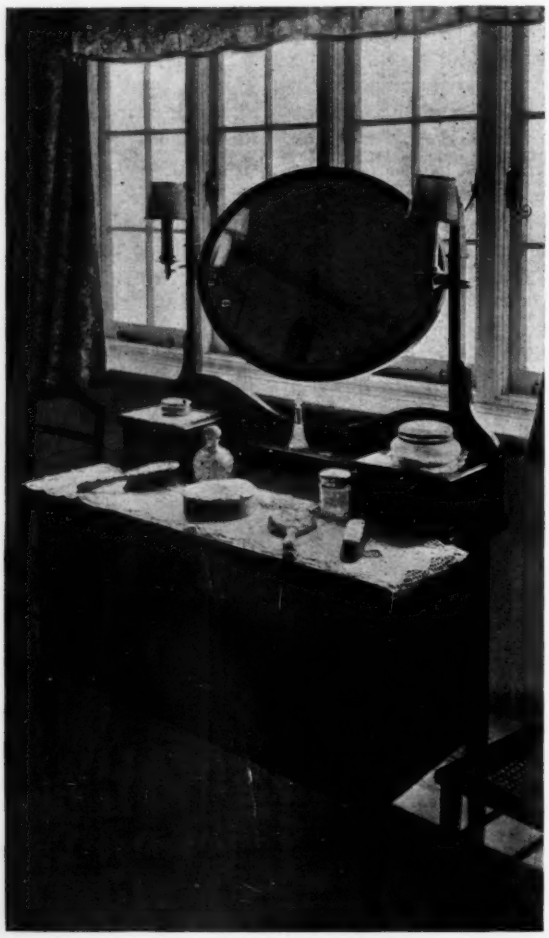
Prevention of Glare.—All lamps used in the home should be adequately shaded or completely concealed from view. The use of the brilliant, clear gasfilled lamp unshaded, or in conjunction with glass shades which do not shield the filament from view, can only result in discomfort due to glare and a decided detrimental effect on the decorative charm of a room. The inevitable com-

panions of glare are harsh shadows, and these, besides hindering vision, still further detract from the effect of a tastefully designed interior.



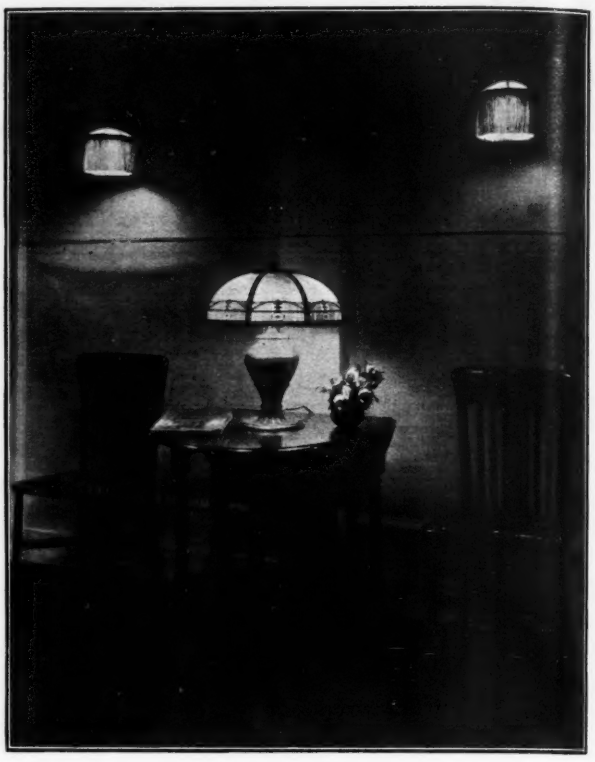
A lighted Shaving Mirror avoids shadows.

Design of Fittings.—Good lighting is the least expensive of home comforts, and often costs no more than bad lighting. The difference between the two is only a matter of using the same amount of current in the right way, and not wasting it on the bad way. The purchase of lighting fittings should be undertaken with the object of obtaining lighting effect plus artistic appearance. A lighting fitting should in the first place conform to the needs of adequate illumination, and its use as a distributor of light must not be subordinate to appearance. No amount of intricate metal or glass work will compensate for either glare or gloom. Since the recognition that utility and beauty is a lighting ideal easily obtainable, linking up the furnishing and decoration of a room with its illumination has become a well-established principle.



Brackets fixed to the Dressing Table provide the best form of lighting. The furniture may be moved but the good lighting is unaffected.

Shades which, in the first place, serve to hide the lamp from view and prevent glare, can be made to strike an added note of beauty in a room already harmoniously



A view of the "Revolving Electric House" to illustrate use of Table Standant and Wall Brackets.

conceived. A colour scheme in curtains, furniture covers and wall-paper may be given the final touch by a silk shade conceived to tone and blend with the rest of the room or strike some happy note of contrast.

Position of Lighting Points.—An installation which has successfully eliminated glare and gloom, and at the same time achieved artistic effect, can only be called complete when various lighting fittings are placed to give maximum service.

The following show how good lighting assists in the bathroom and bedroom. In each case objectionable shadows are avoided. A central ceiling fitting of the enclosed type is the best form of lighting unit in the bathroom. Since the bathroom is invariably used for shaving it is advisable, for this delicate operation to be effected in comfort, to have a bracket fitting placed above the mirror with a white lamp and bowl shade, causing the light to be cast well on to the face; or, better still, a bracket light fixed on either side of the mirror to ensure equal lighting for both sides of the face.

For those who love a last half-hour of reading in bed, illumination is required which is easily controlled and conveniently placed. The central light in a room is unsatisfactory since, unless the reader twists himself or his book, the page will be in the shadow. Then, after having adapted himself to these discomforts, it is nearly always necessary to get out at the moment when a warm bed is the most desirable place on earth, and, turning out the light, begin the perilous journey back to bed in a dark room. A lamp standard on the bedside table, fitted with a white or flame-tinted lamp and delicately coloured shade, will solve the problem; the crowning point of luxury is reached, however, with the use of a bed bracket attached to the head of the bed, and connected by means of a wall-plug in the same way as the dressing-table brackets. The type shown consists of a wire frame shaped in the form of a trough covered with some delicate material of a colour to harmonize with the bedroom colour scheme. Other types may be obtained

Just as experience produces Mazda Lamps, so experience selects them. Instal Mazdas and ensure good light.
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LAMPS
CAN BE BOUGHT WHEREVER ELECTRIC LAMPS ARE SOLD
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2614

in metal of various finishes. All are easily controlled from the bed by pear-switches or pull-chain switches.

When a bedroom has a bay-window, a lighting point is often placed in the bay on the assumption that it is the one and only place for the dressing-table. This scheme is frequently successful when a pendant fitted with one or two lamps and shades of silk or glass is suspended above and in front of the dressing table, but this method has its limitations.

However charming a room may be, there are times when its appearance becomes monotonous, and a welcome change can be made by moving the various pieces of furniture to different positions. Where a lighting fitting has been planned to suit the arrangement of the furniture it will be apparent that changes will be most unsatisfactory. Consider the example of the bay-window. If the dressing-table were moved from the window and placed at the side, either at an angle or against the wall, the lighting fitting which had previously given good service would now be useless.

The most practical way of solving the problem is by the use of wired furniture. The dressing-table can be equipped with a bracket on each side of the mirror, fitted with small lamps and silk shades of suitable design and colour. These brackets are connected to a wall-plug by means of flexible wire. Provided there are wall-plugs in the room, this arrangement makes it possible for the housewife to move her furniture at will, and at the same time ensure adequate light at all times.

Scottish Electric Lighting Service Bureau

ILLUMINATION DESIGN COURSE.

We have received from the Scottish Electric Lighting Service Bureau, with headquarters in Glasgow, a copy of the syllabus of the series of lectures to be delivered during the winter. The subjects of these eight lectures are identical with those announced by the E.L.M.A. Lighting Service Bureau in London, as given in our last issue.* But the dates are two days later, so that if necessary the same address can be given by the same lecturer, first in London and then in Glasgow.

The first of the series, on "Lighting Fundamentals and Principles of Light Control," was given by Mr. W. J. Jones on October 13th. The second lecture, on October 27th, is devoted to "Simplified Methods of Designing Illumination Schemes," and the third, on November 10th, to "The Art of Home Lighting." Subsequent lectures deal with electric lamp manufacture, decorative and shop lighting, floodlighting, the uses of coloured light, etc.

A New Process of Paving Roadways

The repair operations in New Bridge Street, London, during the last few weeks have attracted rather more than the usual public interest, and the pavements have been thronged with people. The explanation is that a somewhat novel method of paving, with bricks lined with rubber material, is being tried. One of the merits claimed for the new method is the reduction of noise of traffic. But, so far as one can judge from the finished areas, the surface seems likely to be distinctly lighter in tint than the ordinary tarred blocks. From the lighting standpoint this would be a distinct advantage; we have several times pointed out that the very dark colour of modern tarred road surfaces tends to render street lighting impotent by diminishing the contrast between objects on the roadway and their background. It is true that it is mainly on roads with intermittent though fast traffic (so that the surface can be seen) that this factor becomes of importance. During the hours of very crowded traffic drivers and pedestrians see so little of the road surface that its exact appearance is of less consequence.

* *The Illuminating Engineer*, October, 1926, p. 296.

E.D.A. Conference, 1926-27

An interesting series of E.D.A. conferences for the coming season has been arranged. These conferences are intended to promote interchange of experience on electrical problems and salesmanship, and to facilitate co-operation between those engaged in different sections of the industry, and the discussion of methods of influencing public opinion. They are open to anyone engaged in any branch of the electrical business.

The following is the syllabus of subjects. Meetings will be held at the House of the Royal Society of Arts (18, John Street, Adelphi, W.C.):—

Oct. 15—"Wiring the Homes of Britain," by Mr. V. W. Dale.
Nov. 19—"Shop-window Display," by E. Willson.
Dec. 17—"Secrets of the Selling Art," by G. S. Francis.
Jan. 21—"Industrial Heating," by S. E. Monkhouse.
Feb. 18—"Assisted Wiring Schemes," by W. F. T. Pinkney.
Mar. 18—"Refrigeration," by L. R. Morshead.

Further particulars may be obtained on application to the Director of the British Electrical Development Association, Mr. J. W. Beauchamp, at 15, Savoy Street, Strand, London, W.C.

The Lighting of a Greyhound Coursing Track

In sporting circles much interest has been taken in the ultra-modern idea of the "electric hare" used in greyhound coursing trials. This electric hare travels on rails, and is driven by a 25-H.P. motor, and the speed can be accurately adjusted. The hounds are placed on boxes at the end of the track, and as soon as the electrical hare comes round they are unleashed, and off they go. To many people familiar with greyhounds it seemed incredible that they could be induced to follow a purely mechanical object. But apparently the hounds enjoy the sport, and take to it quite readily. As soon as they are led into their boxes they show all the signs of eagerness and anticipation, and never fail to pursue the electric hare until it "goes to earth" in a tunnel. The racing track contrived on these original lines at Manchester is said to be the only one of its kind in Europe. It is abundantly lighted by high-power electric lamps, which we understand are equipped with Wardle reflectors, so that sport can take place at night as well as by day.

Lighting the Village Darkness

Mr. V. C. Sampson, writing in *The Electrical Review*, makes some new proposals for the electrification of small communities. He describes his entry into an interesting old inn after tramping a wild stretch of Derbyshire moorland, where an excellent meal was provided. The only weak point was the feeble light, provided by a very smoky though ornate oil lamp. The suggestion of electric lighting was not received with enthusiasm by the landlord. "Theere's bin monny a felly," he said, slowly, "raand here wanting to sell me one of they generating sets, as they calls 'em, but I'm noan having onny. Ingines is noan in my line. I'll use electricity—and be glad to do it—when they brings it raand on a caart, same as old Hawky brings us t' paraffin."

The idea of "bringing round electricity on a cart" set the author thinking, and he outlines the idea of a mobile battery-charging station, sent round on a weekly visit to different consumption points. The idea seems practicable, provided the battery can be properly maintained, and the author's figures seem to suggest that it might be profitable. The chief difficulty seems to be that the scheme is necessarily a stop-gap and transitory one, as it is to be assumed that even the relatively remote districts that he deals with will ultimately be covered by a national scheme of electricity supply.

Sheffield Illumination Society

Ideal summer conditions favoured about forty members and friends of the Sheffield Illumination Society who visited the Sheffield Corporation Sewage Disposal Department at Wincobank on Saturday, the 2nd October. Mr. John Haworth, F.I.C., F.C.S., general manager of the works, conducted the party and described very fully and clearly the methods adopted for sewage purification. The part of the works where the "Sheffield system" of purification is in operation proved specially interesting, and Mr. Haworth informed the members that this system was first experimented with, and put into practice, in Sheffield. The system has been so very successful that more of this plant is now being installed in Sheffield, and many other towns have adopted the same method. It was noted that all the plant was, at least, in duplicate, some being in triplicate, to enable the work to proceed continually, and thus obviating breakdowns.

An inspection of the laboratory terminated a most interesting and educative afternoon.

Mr. J Whitehead, President of the Society, supported by Mr. G. Sayer, Treasurer, moved a vote of thanks to Mr. Haworth, and spoke of the pleasant and instructive afternoon the members of the Society had spent.

The Women's Engineering Society

AUTUMN PROGRAMME.

A number of interesting items figure in the programme of the Women's Engineering Society for the autumn and winter. On November 1st a lantern lecture on "Burma and its Oil Industry" is to be delivered by Mrs. Woodman, who has recently returned from a visit to Burma. On November 20th there is to be a specially conducted tour through the Locomotion, Railway Engineering, Stationary Engines and Motor Engineering Departments of the Science Museum, South Kensington. On December 10th Mrs. Elliott Lynn will lecture on "Aviation as a Career for Women."

Improving the Village

BILL TO BRING RURAL HOMES UP TO DATE.

Those industries which are engaged in the construction and equipment of small dwelling-houses are likely to be appreciably benefited by Mr. Neville Chamberlain's Rural Housing Bill.

The measure, which has passed its second reading, and is expected to become law before the end of the year, aims at bringing old rural houses of the more substantial type up to modern standards of comfort and sanitation. For that purpose it proposes to empower the Ministry of Health to make grants and loans, and to sanction expenditure by local authorities of sums up to £50 in cases where the appreciated value of the house is estimated not to exceed £400.

Such improvements include not only minor structural alterations, repairs, and the provision of sanitary requisites, but also the installation of modern methods of lighting, heating and cooking. Many gas undertakings supplying country districts are likely to take part in the general scheme embodied in the Bill.

Garden Suburbs and Garden Cities

Mr. Chamberlain, the new Minister of Health, in opening the new London and North-Eastern Railway Station at Welwyn Garden City last month, pointed out that a garden city, with its facilities for the erection of factories and industrial establishments, is something different from a garden suburb. Not a few manufacturers have moved out to garden cities in order to escape the burden of rates in the metropolis. One thing, however, both garden cities and suburbs should have in common—the fullest utilization of sunlight—and it is hoped that town-planning authorities will give this a prominent place in their designs.

Cheaper Insurances for Gas-Equipped Premises

We understand that from the 1st September onwards one of the great insurance companies has been making a novel departure—the offer of a 10 per cent. reduction in premiums on policies insuring private residences where certain scientifically proved gas fires, gas cookers, and other domestic appliances are installed. This reduction applies not only in connection with ordinary fire insurances, but also "all-in" policies. We have always thought that insurance companies would do well to interest themselves more closely in the arrangements for both heating and lighting in buildings. In factories, for instance, freedom from accidents is assisted by good illumination. It would be a wise practice to grant reductions on accident insurance premiums in a works that passes a recognized standard of "adequate and sufficient lighting."

One Consequence of the Coal Strike

A BOOM IN GAS FIRES.

From all accounts the coal strike has led to a great increase throughout the country in the sale of gas fires, cookers, etc. The manufacturing centres in Birmingham, Leeds, Warrington and Luton are working at high pressure. In London, it is stated, the number of gas appliances lent on hire by one company is now increasing at the rate of 80,000 a year. Birmingham's Gas Department has completed a record year, having sold 13,400 million cubic feet of gas. For the first time the number of gas fires in use in that city has passed the 100,000 mark, and nearly twice as many cookers and water-heaters are now installed.

The Gas Industry in Conference

The fifteenth Annual Conference of the British Commercial Gas Association was held in Newcastle-upon-Tyne during October 25th-27th, under the presidency of Mr. John E. Cowen, who is prominently associated with several important colliery and steel undertakings in the North. Following the reception by the Lord Mayor of Newcastle, a lecture on "Sunlight and Health" was delivered by Dr. C. W. Saleeby. We understand that the principle of service to consumers again formed an important item for discussion.

Opening of Church Street (Kensington) Showrooms of the Gas Light & Coke Co.

A noteworthy event on October 19th was the opening of the imposing new showroms of the Gas Light and Coke Company at Church Street, Kensington, preceded by a luncheon at the Royal Palace Hotel. The showrooms were opened by H.R.H. The Duchess of York, who was received by the Governor of the Company, Mr. D. Milne Watson, Miss Milne Watson and the Mayor and Mayoress of Kensington. Amongst the guests the Kensington Borough Council and other local authorities were well represented. There were present many of the staff of the Gas Light and Coke Company and representatives of the Royal Institute of British Architects, the Kensington Rotary Club and other bodies, and Mr. L. Gaster attended on behalf of the Illuminating Engineering Society.

We have before us a number of attractive illustrations of these new showrooms in which the very latest types of gas lighting fittings are shown in operation, and we propose to deal with this event fully in our next issue. Meantime we note with interest this enterprising step. In this journal reference has frequently been made to the need for more well-equipped showrooms where the latest forms of lighting units may be seen and demonstrations of their use given to consumers. The opening of these fine new showrooms at Kensington is a step in the right direction.

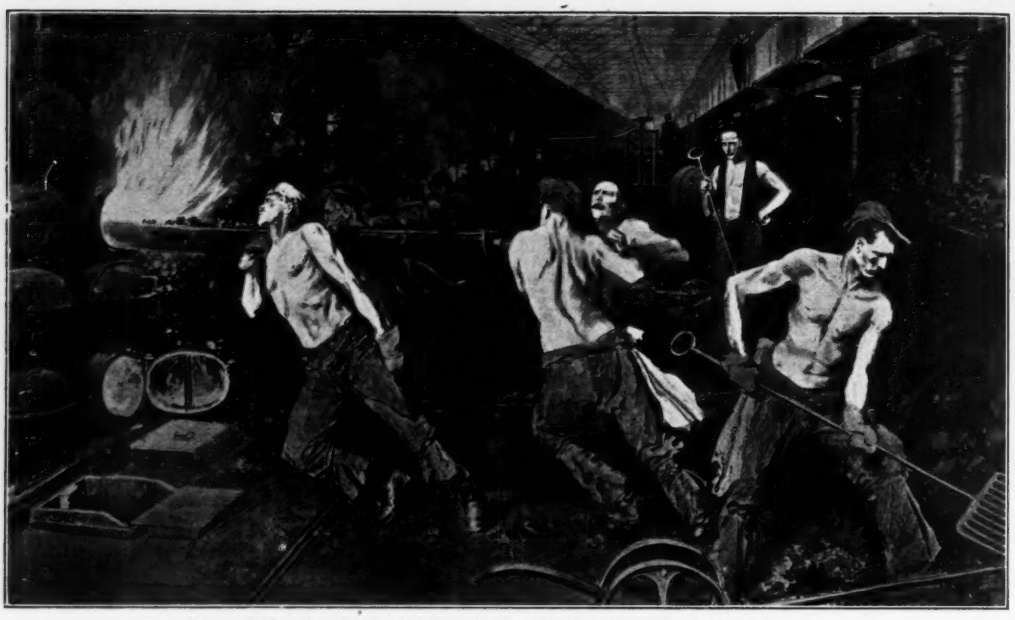

FIG. 1.—Charging Horizontal Retorts in a London Gasworks forty years ago.

The Duke and Duchess of York at Granton Gas Works

"Gas will allow more Sunlight to reach Citizens"

THEIR Royal Highnesses the Duke and Duchess of York inaugurated the new installation of vertical retorts at the Granton Gas Works of the Edinburgh Corporation during their visit to Edinburgh on the 9th October.

The Gas Department's buildings at Granton were suitably decorated for the occasion. After the singing of the National Anthem, the visitors were taken to the front of the No. 2 exhauster house, at which point the inauguration ceremony was performed.

Lord Provost Sleigh, after welcoming the Royal visitors, said the completion of the system at Granton marked the culminating point of a great municipal enterprise. The provision of lighting and heating facilities was a very material factor in the life of the community, and the Corporation of Edinburgh had devoted a great deal of time and attention to this important matter. As showing the growth of the undertaking, it was sufficient to say that the total revenue last year was nearly £600,000. In 1890 the total production of gas was over 1,273 million cubic feet, while it had now reached 2,947 million cubic feet, representing an increase of over 130 per cent. Owing to the growing demand for gas for all purposes, the City Council in 1924 approved of a scheme for the introduction of vertical retorts, along with the necessary motive power and mechanical plant. In addition, larger and more efficient exhausters, condensers, washers, scrubbers and tar-extracting plant had been installed. The combined schemes had involved an outlay of roughly £250,000.

The Lord Provost, having presented the Duke with a gold key, then asked him to inaugurate the new retorts.

His Royal Highness said: It is a great pleasure to the Duchess and myself to be here to-day, and to have this opportunity of inspecting the new process of gas manufacture. I thank the Lord Provost for the most interesting information which he has given to us; and it is quite obvious that the people of Edinburgh have reason to be proud of their Corporation Gas Works. Among all the statistics which have just been given to us, the fact stands out that your output of gas, as indicated by the Lord Provost, is practically one-eighth of the total output of all Scotland. Clearly, the Edinburgh Corporation are prominent among the leaders of the great gas industry in maintaining their works in the highest state of efficiency. This, possibly, is only what might be expected, in view of the fact that it was a Scotsman, Murdoch, who commenced the gas industry in 1792, when he first lighted his house at Redruth with coal gas. It would appear, therefore, to be no more a novelty for a Scotsman to be a leader in this industry than it is for a Scotsman to confer the benefits of his enterprise on the more southern parts of this island. In our densely populated and industrial areas, the use of gas for domestic purposes will go a long way towards freeing these districts from soot and smoke, and will thereby be of the greatest benefit to the health and welfare of the people. The great developments in the gas industry of which the Corporation's new advances are an example will do much towards clearing the atmosphere of your city and allowing more sunlight to reach its citizens. Ladies and Gentlemen, it gives me the greatest pleasure to declare this new installation open.

The Duchess of York then unveiled a commemorative tablet, and was presented with a bouquet. The tablet bore the following inscription:

> EDINBURGH CORPORATION GAS UNDERTAKING:
> GRANTON WORKS.
>
> This tablet to commemorate the inauguration by His Royal Highness Albert, Duke of York, K.G., K.T., of the new vertical retort plant and machinery was unveiled by Her Highness the Duchess of York on October 9th, 1926. The Right Hon. Sir William Lowrie Sleigh, LL.D., Lord Provost of the City of Edinburgh.

Councillor James Stewart, after thanking the Royal visitors for their presence, asked the Duchess of York to accept a silver bowl as a souvenir of the occasion.

The Duke then opened the door of the works, and the party entered No. 2 exhauster house, where they signed a specially illuminated page of the visitors' book.

The beautifully illustrated brochure prepared for the occasion contains the history of the Edinburgh gas undertaking from the year 1816 onwards. But while history is interesting, the extent of the public service demanded of the undertaking at the present time is even more fascinating. Of the 131 per cent. increase in output since 1890, we learn that nearly 40 per cent. has resulted from the last five years' working. The production of gas for the past year was 153,097,000 cubic feet in excess of the previous year. The maximum day's output is now 13 million cubic feet, an increase of one million cubic feet as compared with the maximum day's output of the previous year. The number of consumers in 1890 was 65,000. It is now approximately 114,000.

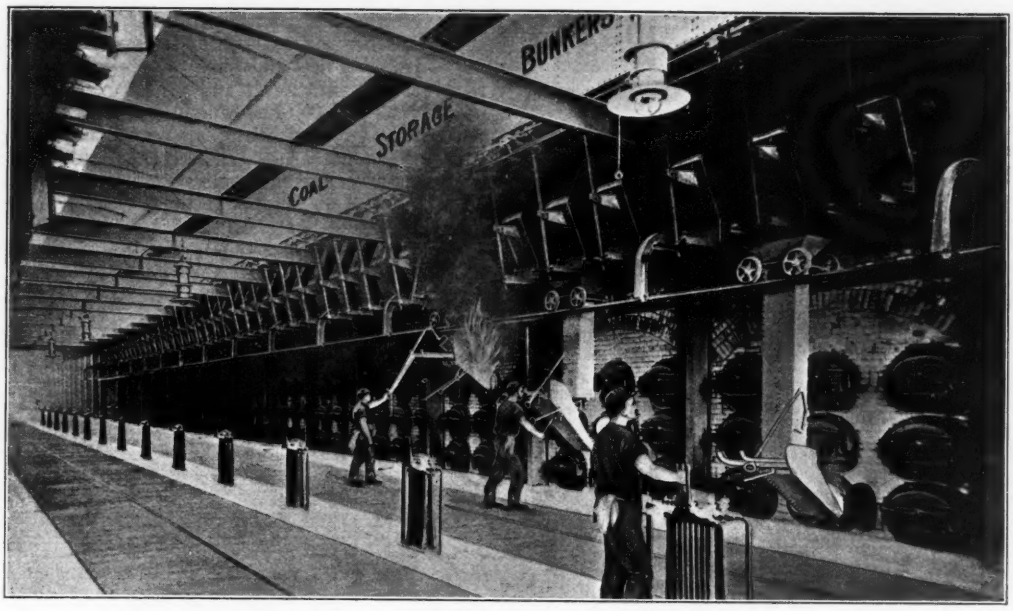

FIG. 2.—Charging the Inclined Retorts at Granton, 1902.

Gas is distributed over an area of about 50 square miles, from Joppa in the east to Balerno in the west. The length of the mains is 483 miles and their sizes vary from 2 inches to 48 inches in diameter. There are, in addition, over 1,500 miles of service pipes conveying gas from the mains to consumers' meters. There are 82,000 gas appliances on loan and hire. The figure does not include the many thousands of appliances belonging to consumers themselves.

The wages bill amounts to more than £148,000 annually, and employment is provided for over 900 workers.

Reference is also made to the importance of the by-products of gas manufacture in Edinburgh. Some 200,000 tons of coal are carbonized annually. In the busiest season nearly 900 tons a day are used. In the process of distilling this large quantity of coal, not only the gas but all the valuable by-products are recovered. These are represented chiefly by 120,900 tons of coke, 12,900 tons of tar and 2,450 tons of sulphate of ammonia.

The coke, after providing for works' requirements, is disposed of as a heating agent for other industries, as well as for domestic heating. Being a smokeless fuel its use tends to reduce atmospheric pollution, and thus contributes towards the realization of a smokeless city. From the tar materials are obtained for the surfacing of roads, a process which has done much to allay the dust nuisance. Many important chemicals, drugs and valuable dyes are also extracted from this residual. Finally, sulphate of ammonia, being a fertilizer, aids in the production of food supplies.

With these illuminating details of the extensive service of the gas undertaking at Edinburgh it is not surprising to find at the end of the detailed description of the new plant and its functions a repetition of the recent words of the President of the Board of Trade (Sir Philip Cunliffe Lister): "There is unlimited scope before the industry; and, with the scientific developments which have taken place, anyone who begins to appreciate what the gas industry has passed through must be certain that it has a great and expanding future before it . . . . I am sure that the industry has a great future, and that it is entitled to claim that it should be regarded both as a public utility service of the highest importance to the social life of the country and also as a progressive chemical industry. Its development is vital to the industrial prosperity of this land."

FIG. 3.—Operating the new Vertical Retorts at Granton Works, 1926. View of top bench.

A Modern Artificial Sunlight Exhibit

WE had recently an opportunity of visiting the new and well-equipped exhibit of Quain Sunlight Lamps Ltd. at 26, Victoria Street. Readers will recall that we referred to some of Mr. Quain's special apparatus on the occasion of Dr. Saleeby's lecture before the Illuminating Engineering Society last year. In the intervening period these appliances have been perfected and some new models introduced. To illuminating engineers the sunlight arc lamp with quartz envelope (see Fig. 1) is of special interest—both as an example of diffusion of light and as a source of ultra-violet rays. The silica envelope, besides being transparent to the ultra-violet rays, can withstand great heat, and the enclosure enables an arc approximately three inches in length to be drawn out. This has two main advantages; it enables about 75 per cent. of the available voltage to be used on the arc, i.e., on a 200-volt circuit the arc is actually working at 150 volts, so that an unusually large proportion of the energy is utilized. In addition, the longer arc, with its bridge of luminescent vapour, yields a spectrum exceptionally rich in ultra-violet rays. A third obvious advantage of enclosure is that there are practically no fumes emitted—a drawback that is apt to be in evidence in arcs of the ordinary open type.

In certain cases, however, open arcs are still preferred by some people for therapeutic work, and Mr. Quain had on view an ingenious form using two arcs in series, an expedient which again serves to ensure an exceptionally high efficiency. We were also interested in a small form of arc with electrodes of a special alloy, which may play an important part in therapeutic work of the future. An arc between tungsten electrodes has the advantage of being very rich in the short ultra-violet rays. The new alloy, however, whilst being very much cheaper, yields a spectrum substantially the same as that of tungsten. It has also the merit that the electrodes, in burning, form a fusible slag which prevents access of oxygen, so that the electrodes burn away more slowly and last longer. This form of arc is still being developed, but has interesting possibilities. By means of a simple little apparatus equipped with a uranium fluorescent screen the ultra-violet component of these and other lamps can be studied, and the efficacy of various protective screens for checking the passage of ultra-violet rays tested.

FIG. 1.—Quain Sunlight Arc Lamp with enclosing silica chimney.

The variety of lamps available for medical treatment is now large. The exhibit also contains several units of the quartz-tube mercury lamp type, one of these being equipped with a water-jacket so that the lamp can be applied for very close local treatment. "Dosage" naturally depends entirely on the form of lamp and the condition of the patient. With these powerful mercury lamps an exposure of a few minutes may sometimes suffice; whilst they are widely applied for general tonic effects, it seems probable that their most useful field will be for the treatment of local diseases (such as ulcer and skin affections), where a highly concentrated dose of very short wave radiation is desired. On the other hand, many diseases need milder and more prolonged dosage, exposure to ultra-violet light being accompanied by radiant heat energy—conditions, in fact, approximating more closely to those of natural sunlight. For this purpose a neat form of combined unit (shown in Fig 2) has been evolved. This arc-radiator combines, within the same copper or nickel plated reflector, an arc between carbon electrodes and one or more heating elements. These are under separate control. The operator can use either the arc, the incandescent heater, or both. A feature of this apparatus is that the heating resistances are used in series with the arc to steady it, so that when the apparatus is in operation all the energy is usefully applied. The apparatus can be modified in various ways; for example, tungsten or impregnated electrodes can readily be substituted for carbon ones if desired. The well-insulated handles encasing the electrode holders guard against any possibility of shock, and there are other good features in the design.

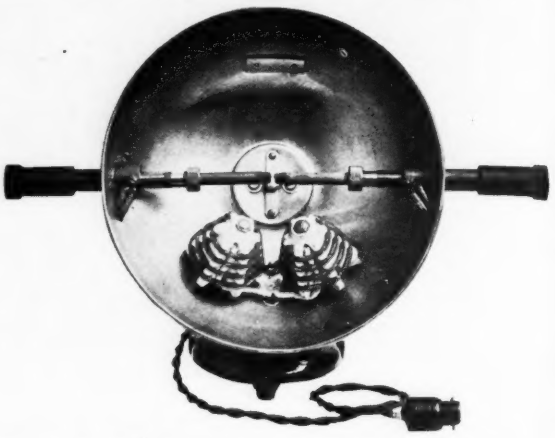

FIG. 2.—Arc Radiator, combining ultra-violet radiation from arc with radiant heat from resistance units.

Besides these special forms of lamps there were on view units utilizing the heat radiation from an incandescent gasfilled lamp, and many other heating devices devised in the interests of comfort and convenience. Amongst these one noted the handy little water-heater, with an immersion heating element mounted within quartz, and various mats and screens equipped with a network of insulated wires which serve as heating elements. A radiant heat screen of this kind, which consumes but a very moderate amount of energy, serves as an admirable protection against draughts, and adds greatly to the comfort of the home.

Lastly, visitors may also be interested in the Quain ozonizers, which have had so many varied applications, and in the "Ultrozone" portable ozonizer with its high-frequency violet ray attachment.

Impressions of Gas Lighting in England

It is always interesting to observe the impressions of conditions in this country formed by those abroad. In *The Gas Age Record* we observe an article by Mr. H. O. Andrew entitled "Points of Interest to a Gas Engineer in Europe," and referring more particularly to his impressions of the gas industry in England. Much of the information he gives will naturally be familiar to English readers, but it is of interest to observe that domestic gas rates are much the same as in the United States, although there are fewer cities with rates favouring the large scale user. Mr. Andrews was impressed by the large scale on which operations are conducted at the works of the Gas Light and Coke Co. at Beckton, which he visited. He also comments on the prevalence of gas for street lighting in London, as well as the other larger cities of England. "The result is that the streets are very well lighted indeed, and causes regret that this desirable off-peak load has been lost in the United States." (There is surely a hint here to the British gas industry not to neglect the lighting load, which forms such an important feature of the gas business.) In conclusion, the author mentions the names of a number of experts who, by arrangement with the Carnegie Institute at Pittsburgh, are to speak at the coal conference to be held in that city in November. Amongst these is Dr. Lessing, who is well known to our readers, both as one of the leading chemists familiar with gas problems and as a member of the Council of the Illuminating Engineering Society.

Shop Lighting— and the Lighting Engineer

The artificial lighting of shop-windows and interiors in these days is very much the concern of the illuminating engineer. No longer is the question of lighting left until a late stage and to the unadvised decision of the owner of the building. The lighting installation, including the selection of all fittings and equipment, has now become a very important part of the illuminating engineer's work.

Illustrated in this panel is a typical B.T.H.

X-RAY REFLECTOR

the supremely efficient unit for shop-window lighting. On the left is shown the "Ace" Enclosing-diffusing Fitting, the glassware of which is made in one piece. It has a large diffusing surface and is dustproof. This fitting is particularly recommended for the lighting of shop interiors.

The very comprehensive and up-to-date range of enclosing and semi-enclosing fittings is displayed at all our showrooms, and types can readily be selected to suit any interior lighting requirements. We shall welcome the opportunity of submitting sample fittings for demonstration on site.

Specify B.T.H. Lighting Apparatus and give your clients the benefit of our long experience in the design of efficient lighting equipment.

The British Thomson-Houston Co. Limited

MAZDA HOUSE, NEWMAN ST., OXFORD ST., LONDON, W.1

Fittings Factory: Lower Hillmorton Road, Rugby.

Branch Offices:

Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Middlesbrough, Newcastle, Sheffield, Swansea.

B T-H

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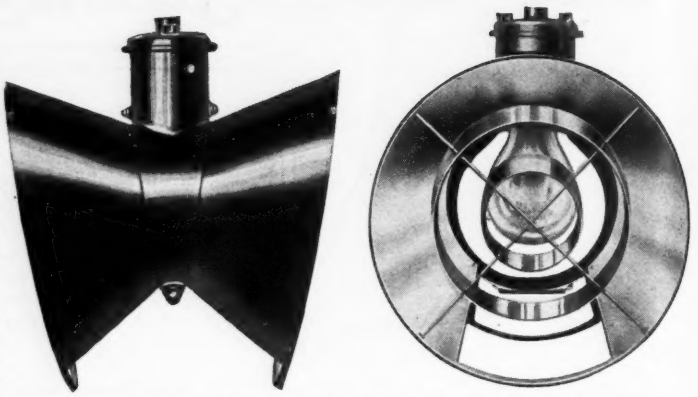
TRADE NOTES & ANNOUNCEMENTS

AN INTERESTING STREET LIGHTING UNIT.

The accompanying two illustrations show a special form of street lighting unit exhibited by the British Thomson-Houston Co. Ltd. at the Conference of the Institution of Public Lighting Engineers in Newcastle-upon-Tyne. This may be regarded as an example of the "longitudinal" system whereby the greater part of the lighting flux is concentrated on the roadway along the length of the street. The unit consists essentially of a housing containing an all-porcelain Goliath E.S. lampholder to receive a 300-watt Mazda lamp, and two reflectors arranged so that one lamp projects a beam in two opposite directions. The axis of the beam is inclined about 10° below the horizontal; thus the polar curve is very favourable to uniform illumination of the roadway. The housing consists of three aluminium castings bolted together. The top cap-shaped casting provides the point of suspension and acts as a weatherproof cover. The other two castings form the support for the lampholder, with provision for adjusting the lamp to a correct central position and for the reflectors.



Two Views of the B.T.H. Special Double Parabolic Highway Lighting Unit.

White vitreous or porcelain-enamelled steel reflectors of a special shape to give the requisite form of light distribution are secured to the housing, and contain a pair of annular members at their extremity, supported by a light frame in the mouth of the reflector. These units are enamelled grey on the exterior and white inside, and when suitably mounted give a distribution of light which is very suitable for street lighting. The unit is also so designed that glare is reduced to a minimum.

"SILVERSTONE" GLASSWARE.

Yet another instance of recent advances in the design of decorative lighting glassware, attractively presented in a new catalogue, is to be found in the recently issued list of "Silverstone" glassware, issued by Messrs. Metro-Vick Supplies Ltd. The catalogue shows a considerable variety of diffusing units, consisting of a three-ply glass with an exceptionally thin layer of crystal glass, a centre layer of Cryolith Opal glass, and a further outside layer of crystal glass. Such glassware naturally entails very skilled workmanship; it is stated that owing to the quality of the glass and the thin nature of the layers the loss is insignificant—the darkening in shade which is apt to occur with three-ply glass being completely avoided.

The most attractive feature of the list, however, is the representative collection of "Silverstone" glassware with fine shades of colouring and hand-painted designs. These are photographically reproduced in colour direct from the fittings themselves. In many cases the combination of the colouring of the glassware and the metal work gives charming results. Such lighting units obviously open out a new field in domestic lighting and are immensely in advance of the units available in this field a few years ago. Apart from its technical interest, the catalogue is excellently printed, and this too marks a great contrast in publicity literature as compared with the methods of past years.

ILLUMINATING ENGINEERING AND THE CONTRACTOR.

The latest issue of *Holophane Illumination* (Vol. X, No. 8) is written specially for the benefit of contractors. There is a thoughtful introduction emphasizing the important part played by the electrical contractor in the lighting industry and the aid he can render to the cause of better lighting. The modern contractor should have a knowledge of the latest developments in illuminating engineering, united with considerable tact and persuasive power. He should make the consumer feel that he is not there merely to get the job at all costs, but to render "service" as well as supplying material and sound workmanship. He is often in a position to do a great deal to raise the general standard of lighting, and to dissuade consumers from adopting methods involving waste of light. In these days the contractor has many useful sources of information. Much data has been collected by the Illuminating Engineering Society. There are also leading manufacturers, such as Holophane Ltd., who have made a practice of arranging periodical discussions and demonstrations, at which contractors are welcome—and who have well equipped showrooms where the latest appliances can be seen and illuminating engineering departments willing to aid the contractor with special advice. The importance of good lighting is emphasized in an article by Mr. T. E. Algar (Past President, E.C.A.), and Mr. H. J. Cash (another E.C.A. Past President) discusses co-operation in illuminating engineering from the contractor's standpoint. The final portion of the issue contains short notes on the lighting of the home and the illumination of churches, shops, factories and streets, assisted by attractive illustrations.

"HAILGLASS-WARE."

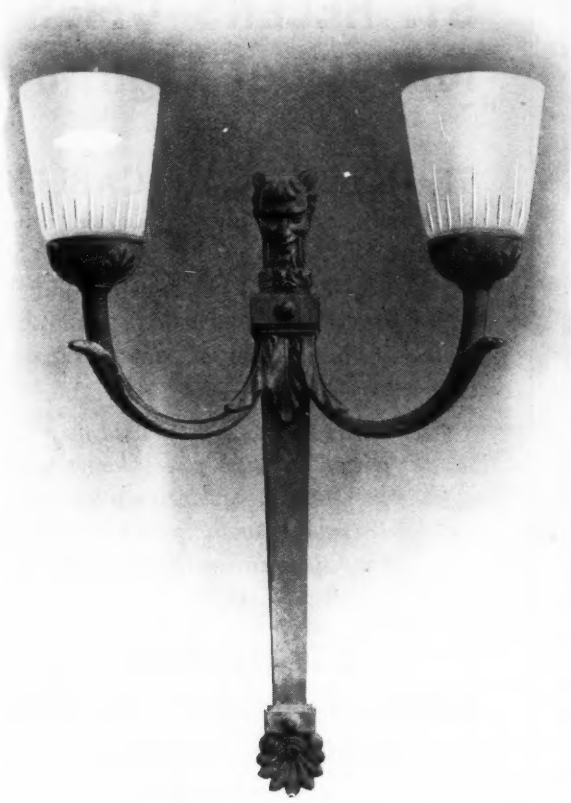
The New Catalogue of Messrs. Ackroyd & Best Ltd.

We have received from Messrs. Ackroyd & Best Ltd., to whose new showrooms near the Tower of London we recently referred, a copy of their new catalogue of "Hailglass-Ware." The catalogue is an imposing production, and a very wide range of glassware is illustrated. In the section dealing with illuminating glassware some of the most pleasing types are the totally enclosed decorated units executed in diffusing glass in a great variety of shapes and patterns. Many forms of ornamental bowls, shades and reflectors, "Flambeaux" ornamental table lamps, etc., are also illustrated, some of them of distinctly original design. There are also appropriately designed shop-window silvered-glass reflectors of the now familiar parabolic and asymmetric types, and a small shell satin-finished variety which can be conveniently used for close work in order to screen the filament.

Illuminating glassware, however, only forms a part, though doubtless an important section, of the "Hailglass" products. The portion of the catalogue dealing with clear and coloured cased crystal-cut glassware is illustrated in a novel manner by pages executed in grey-blue, and well devised to give an idea of the appearance of the glass. Similarly the section on vases, jugs, bowls, etc., for decorative and household use is embellished by a series of pages showing the articles in their actual colours. The same method applied to some of the decorative illumination bowls and shades is very effective.

Other specialities include globes and shapes of diffusing glass bearing names and devices for advertising purposes, globes and chimneys for table and shop lamps, heat-resisting ware for use with arc lamps and printing machines, and an array of dental and surgical accessories. Interleaved in the catalogue are numerous illustrations of the company's main factories at Morley and displays in their showrooms in London, Glasgow, Leeds, and elsewhere.

We understand that a printed price list is in course of preparation, and will be available very shortly.



A

HARCOURT FITTING

THE illustration here shown is a typical example of the many designs of Electric Light Fittings manufactured by Messrs. Harcourts Ltd., Birmingham, now owned and controlled by the Metropolitan-Vickers Electrical Company Limited

A full range of designs can be inspected at any time at the showrooms of

METRO-VICK SUPPLIES LTD.

(Proprietors—Metropolitan-Vickers Electrical Co. Ltd.)

Metro-Vick House, 145 Charing Cross Rd.
London, W.C.2

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D.P. BATTERY EXHIBITS AT THE RADIO EXHIBITION.

At the Radio Exhibition the D.P. Battery Co. Ltd. is showing a series of new types of batteries. Amongst these special interest attaches to the Kathanode low-tension type, which is credited with exceptionally long life, and the D.P. high-tension battery, made up in 30-volt units, with tappings for every two volts. Yet another novelty is the Hylo battery, which can be used either as a 2, 6, or 24-volt unit. A feature is the convenience of this arrangement for charging; the set being charged in series off the usual supply, but connected in series, parallel, or series-parallel when in use.

"PELAPONE" ELECTRIC GENERATING PLANTS.

These electric sets are made in a range from 10 to 1,000 lights, and illustrated in a well-got-up little booklet issued by the New "Pelapone" Engine Co. Ltd. They are stated to be suitable for every requirement, from royal palace to tiny cottage. Six thousand of these sets are in operation, and on the final page of the booklet there is an imposing list of recent purchasers. This variety of applications is well illustrated in the sketches of country mansions, etc., introduced into the booklet. The plant is simple in construction, and operated on a four-cycle system, and is thus easy to start. When the engine is not needed for driving the dynamo it can be applied for other purposes, e.g., for driving circular saws, farm machinery, etc.

MAPS OF ARC SPECTRA.

We have received from Messrs. Adam Hilger Ltd. a specimen of the very comprehensive series of maps of arc spectra prepared by Dr. J. Bardet. The cards are assembled in a paper-bound volume of 64 pages, 54 separate phototype cards of spectra being included and the whole mounted in a stiff linen case. The scope of the work is limited to the region 2500 to 3500 A, and it enables the variations in spectra of all the chief elements throughout this range to be studied.

BENJAMIN SPECIALITIES.

The latest issue of *The Benjamin Reflector* devotes an unusual amount of attention to radio accessories, including valves, grid leaks, valve holders and other components. Lighting, however, is not neglected. There are two good photographs of lighting installations, one showing the overhead lighting of a large compositors' room in a printing works, the other a section of an exhibition showing display windows, etc.

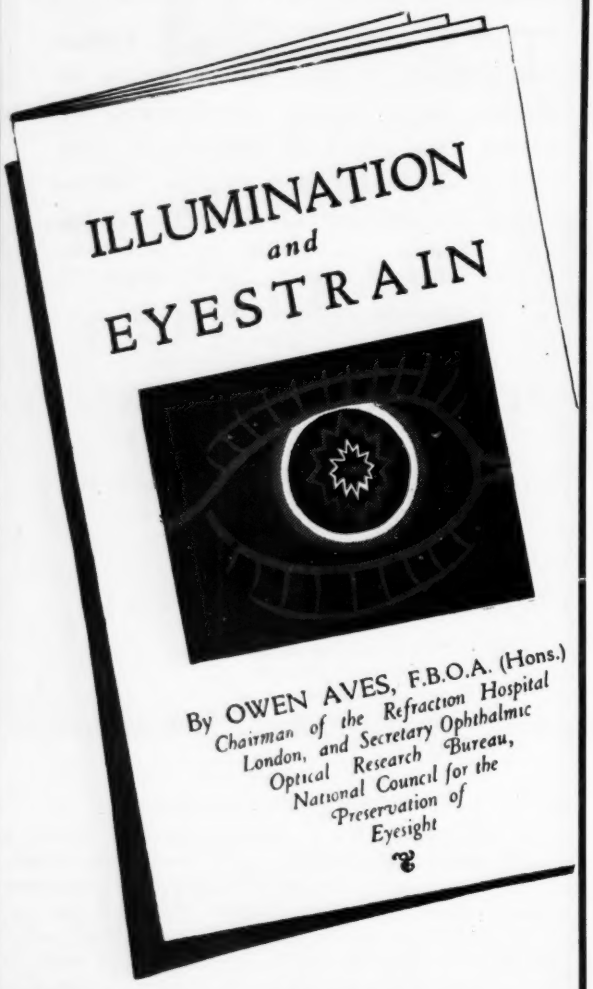
APPLICATIONS OF MERCURY-VAPOUR LAMPS.

In these days the possibilities of the mercury-vapour lamp for lighting are apt to be overlooked, and it is not generally realized that there are many large industrial establishments lighted in this way. In a well-illustrated booklet issued by the Hewittic Electric Co. Ltd., of Walton-on-Thames, the applications of this "service light" are discussed and some pictures of large installations are presented. The peculiar colour of the mercury-vapour lamp naturally imposes some limitations, but it is pointed out that in many cases the low intrinsic brightness of the light and the manner in which the light is diffused are distinct advantages. The tube containing mercury vapour differs completely from most other illuminants in the fact that the light is emitted by a column of gas of considerable cubic capacity, instead of from a relatively minute highly incandescent body.

Another booklet deals with the production of rectifiers, which has become quite an important section of the electrical industry and which is having quite a revolutionary effect on certain fields of operations.

Finally we may note a third list dealing with yet another development, the Ulviarc lamps, using luminescent mercury within a quartz tube envelope. Such lamps are amongst the richest known in ultra-violet rays, and they are now being widely experimented with for the treatment of many difficult diseases and are being specially designed for this form of work.

Write for a copy of this Interesting Booklet !



"For the illumination of the home, small offices, and all conditions of lighting where small points are necessary, such a lamp is ideal *for preventing eyestrain.*"

Mr. OWEN AVES, F.B.O.A., (Hons.) in "Illumination and Eyestrain, — Some Notes on the Effect of Artificial Lighting upon the Human Eye."

Royal "Ediswan" Fullolite Lamps protect eyesight. The light which is filtered and diffused through their opal bulbs enables the user to read or write, study, or sew without fatigue.

Fit
ROYAL
"EDISWAN"
FULLOLITE

THE EYESIGHT-PROTECTING LAMP

Fully licensed under Patent Nos. 23765/12, 10918/13 and others.

THE EDISON SWAN ELECTRIC CO. LTD.
123-5 Queen Victoria Street, London, E.C.4

I.E.2.

ST. HELENS C.T.S. for Street Lighting

ST. HELENS C.T.S. CABLES are used successfully throughout the Kingdom for the severe conditions of **STREET LIGHTING,** where other types of cable have failed; and the following testimonial is one of many received:

"St. Helens C.T.S. is used here for wiring all new street lamps, and has given satisfactory service inside tramway standards under adverse conditions during the last 5 years."

WRITE FOR DETAILS TO:

ST. HELENS Cable & Rubber Co. Ltd.
SLOUGH, BUCKS.
(PHONE 333)

CRYSELCO ADVERTISING NOVELTIES.

From Cryselco Ltd. we receive a varied assortment of advertising literature. The new lamp catalogue, which embodies reduced prices, bears on the cover a sectional illustration of the Cryselco open-bulb type ("the lamp with two skins"), which we have previously described, and which illustrates the prevailing tendency towards diffusion of light and elimination of glare. There are also particulars of the Cryselco "Pearl" lamps (internally frosted), train-lighting lamps, carbon and automobile lamps, etc. Current practice in advertising literature is also followed by the insertion of a striking double colour printed page dealing with colour-sprayed and "daylight" lamps. At the conclusion of the catalogue are some large reproductions of photographs of lighting installations, including a large drapery showroom at Bradford, the booking-hall of Oxford Circus Tube Station, the concours at Waterloo Station, etc. Individual types of lamps are also dealt with in an attractive series of leaflets, in which the familiar figure of "Col. Chris. Elco" appears. This gentleman again figures in several boldly executed posters emphasizing the merits of Cryselco lamps.

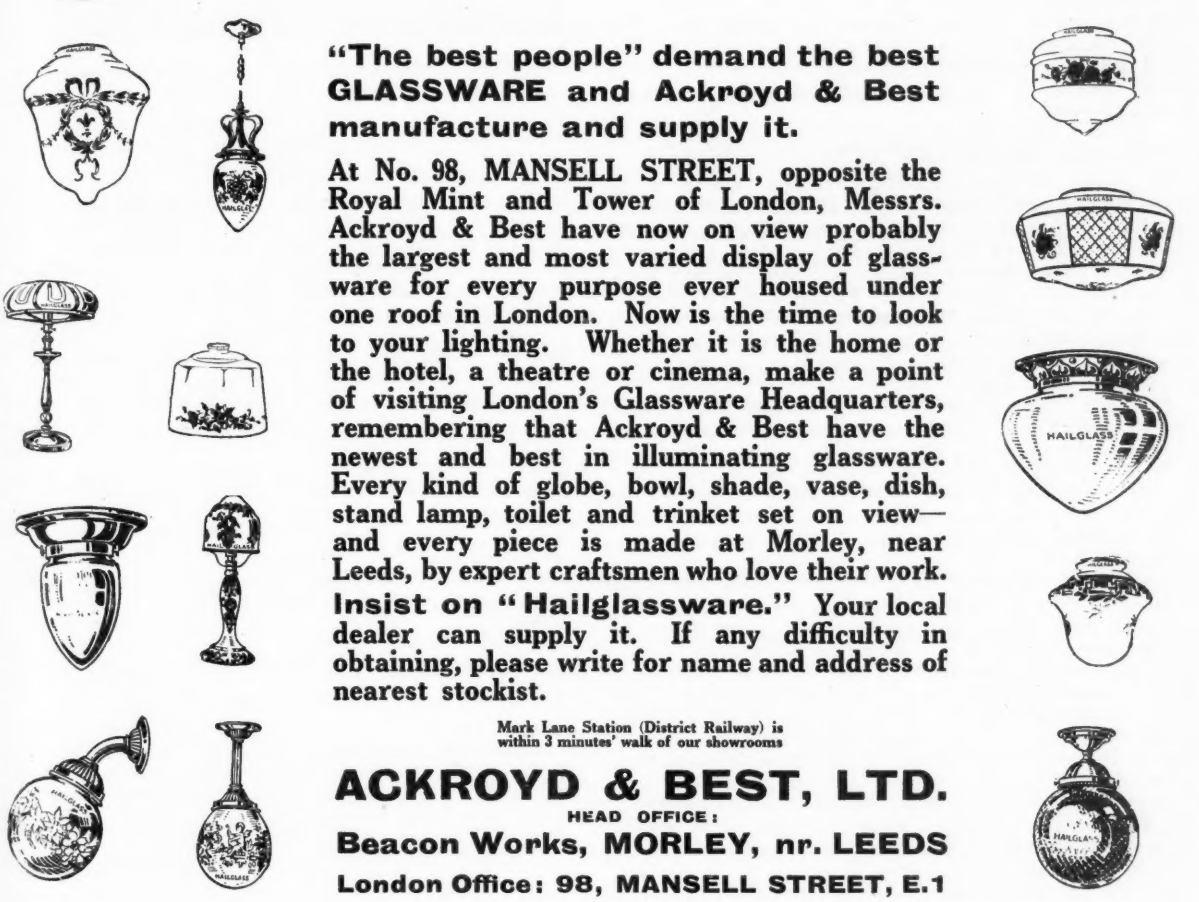
SIEMENS SHOP-WINDOW EQUIPMENT.

In these days we find not only general catalogues dealing with lamps and lighting appliances, but lists devoted to individual aspects of illumination. Catalogue No. 153, issued by Messrs. Siemens and English Electric Lamp Co. Ltd., deals with show-window equipment very completely. Numerous standard forms of reflectors, including the Benjamin trough type and the Holophane units, are shown; the latest totally enclosed Holophane form is a very compact unit, which, like the other reflectors shown, can be readily combined with colour screens. There are also illustrations of the spotlight projectors, illuminated signs suitable for use in the window, and Venner time switches, by the aid of which lighting up after business hours can be controlled to any desired extent.

"The best people" demand the best GLASSWARE and Ackroyd & Best manufacture and supply it.

At No. 98, MANSELL STREET, opposite the Royal Mint and Tower of London, Messrs. Ackroyd & Best have now on view probably the largest and most varied display of glassware for every purpose ever housed under one roof in London. Now is the time to look to your lighting. Whether it is the home or the hotel, a theatre or cinema, make a point of visiting London's Glassware Headquarters, remembering that Ackroyd & Best have the newest and best in illuminating glassware. Every kind of globe, bowl, shade, vase, dish, stand lamp, toilet and trinket set on view—and every piece is made at Morley, near Leeds, by expert craftsmen who love their work.

Insist on "Hailglassware." Your local dealer can supply it. If any difficulty in obtaining, please write for name and address of nearest stockist.



Mark Lane Station (District Railway) is within 3 minutes' walk of our showrooms

ACKROYD & BEST, LTD.

HEAD OFFICE:

Beacon Works, MORLEY, nr. LEEDS

London Office: 98, MANSELL STREET, E.1

DOMESTIC LIGHTING UNITS.

We have received from the British Thomson-Houston Co. Ltd., some further particulars of domestic lighting units. The adjacent illustration shows a room lighted by the "Eye-Restolite" fittings illustrated in our last issue, the chief feature of which is the combination of upward light furnishing general illumination with local lighting for reading purposes. Somewhat the same idea is applied in the "Luxor" pendant fittings, which reflect about 75 per cent. of the light upwards, whilst the remainder is filtered downwards through a diffusing bowl. This very soft form of lighting opens up new possibilities in decorative lighting, as the unit can be readily utilized within silk shades without the efficiency being materially impaired.

Another very serviceable line of diffusing units for general lighting (the "Ace," "Keldon," and "Trojan" fittings) is of the totally enclosed type now becoming popular. The "Trojan" unit, in particular, which is very simple in form and may be mounted direct on the ceiling, seems excellently adapted for use in bathrooms, etc., where it is very convenient to have the unit well out of the way. In the "Trojanette" form this unit is specially designed for kitchen use. The enclosing opal glass gives a soft light free from glare, and the metal canopy is coated with a permanent white enamel, which always looks clean. The unit is dustproof, and is very easily fixed in position.

THE NEW METRO-VICK HOUSE IN GLASGOW.

On October 7th, Metro-Vick House, Glasgow, the new home of the Metropolitan-Vickers Electrical Co. Ltd. and Metro-Vick Supplies Ltd., situated at 74, Waterloo Street, was formally opened. Members of the press were afforded an opportunity of examining these fine new premises, and were also entertained to luncheon at the Station Hotel. The style of this building, designed by Mr. James T. Thompson, of Glasgow, may be described as "Modern Renaissance." The cornice is relieved by some fine carvings of the head of an owl, a lion, and a ram, symbolizing "Sagacity," "Strength," and "Tenacity."

There is a large window frontage in Waterloo Street, which has been effectively applied to demonstrate modern methods of show-window lighting. Many attractive colour schemes can be seen, and leading stores in Scotland will be invited to use the windows to display their products and witness the effect of efficient lighting.

The building consists of six floors, and has a flat roof convenient for further extensions. The main entrance door bears above it the first-known made model of Tutankhamen's head in bronze. The door opens into a marble-paved entrance hall, giving access to the main showroom, where a fine display of fittings manufactured by Harcourts Ltd. (an associated Company of Metropolitan-Vickers Electrical Co. Ltd.) is on view. This showroom is decorated in the period of George I, and forms an admirable setting for the exhibits. A full range of domestic appliances, silk shades, glassware, and wireless appliances may also be seen, and there will be demonstrations daily.

On the first floor is the trade counter, on the second are offices, and most of the remainder of the building is devoted to storage accommodation. Provision has also been made for a wireless workshop where repairs to sets may be effected. There are lifts for passengers and the conveyance of goods, and this is stated to be the first new "all-electric" building in Scotland.

Arrangements have been made to "floodlight" the building in the evenings, the scheme being to throw into relief the main architectural features, the tops of the pilasters, the cornice, and the animals' heads already mentioned.

THE "SEELCO" WIRING SYSTEM.

A catalogue, No. 157, issued by Messrs. Siemens and English Electric Lamp Co. Ltd., deals with the "Seelco" wiring system, a feature of which is its simplicity and inexpensive character. The cables consist of single, twin and three core rubber, insulated and sheathed with a seamless tube of lead alloy, and the system is specially to be recommended for the economical wiring of the many new houses now being erected.

CARL ZEISS PRODUCTS.

Carl Zeiss (London) Ltd. is the name of the Company lately incorporated in England which is now handling the products of the famous optical house of Carl Zeiss, Jena. Their registered office is Winsley House, Wells Street, London, W.1. The principals of Messrs. J. W. Atha & Co., who heretofore held the distribution in Great Britain and Ireland of Zeiss products, are now on the Board of the new Company.

FIG. 1.—A Living Room lighted by a Table-Standard equipped with an "Eye-Restolite" and Mazda Lamps.

SOMETHING BETTER FOR SHOP-WINDOW LIGHTING.

This is the title of a leaflet issued by Messrs. Falk, Stadelmann & Co. Ltd., in which the new "Sunstar" silvered glass reflectors are featured. These reflectors are warranted not to peel, are impervious to heat and damp, and are made in a great variety of shapes suited to different classes of windows. A special form has also been developed for use with colour screens. We are glad to see that polar curves of light distribution from the chief varieties are also presented. The list also contains an illustration of the metal reflector for show-window lighting; these have a silvered fluted-glass inner surface with a japanned tin back. On the reverse side of the leaflet are particulars of "Stringolite" fittings using tubular lamps, suitable for lining the sides of windows; these units are also made up in short lengths on a bracket. Finally, there is an illustration of the trough fitting, also lined with silvered glass backed by japanned metal exterior, which is designed to take 100-watt lamps of the standard types spaced 12 inches apart. The leaflet thus refers to a considerable variety of window-lighting equipment, from which consumers may take their choice.

MOTOR EXHIBITION, OLYMPIA, 1926.—STAND 232. THE EDISON-SWAN ELECTRIC CO. LTD.

We understand that the Ediswan exhibit at the coming Motor Exhibition at Olympia will include the range of Royal "Ediswan" automobile lamps for every motoring purpose; and in the interests of these well-known products the manufacturers have published an interesting booklet on "Night Driving," the main text of which is written by the Editor of *The Autocar*. Copies of this readable booklet may be obtained at the Ediswan stand.

Another interesting exhibit is the Ediswan dry-charged starter battery. This battery obviates the necessity of a long first charge. All that is required is to fill the battery with pure brimstone sulphuric (accumulator acid), fit to the car, and charge for four hours from the lighting-set dynamo. After this period of driving the battery is ready for starting purposes. Following this first charge it is not necessary to change the acid. Ediswan give a six months' guarantee, which, of course, is much longer than is customary.

Other Ediswan exhibits are petrol-store lighting sets, switchboards for charging accumulators and garage lighting, loose plates, and accessories for the foregoing.

"MAXLUME" LIGHTING FITTINGS.

The new catalogue of fittings for factories, public buildings, and other requirements, issued by Messrs. Veritys Ltd., again quotes in its introductory pages the recommendations of the Home Office Departmental Committee on Lighting in Factories and Workshops. The display of illustrations is a very representative one, units for practically all types of installations being included. There are also several illustrations of installations in which "Maxlume" reflectors are used, views of street lighting, etc. Some condensed information on lighting practice also figures in the introductory pages.

REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED

ACCUMULATOR CHARGING, MAINTENANCE AND REPAIR; *by W. S. Ibbetson. (Sir Isaac Pitman & Sons, London, 1926; pp. 118. 3s. 6d. net.)*

This little book has been written for all types of users of accumulators, and is intended to meet the actual requirements of both the amateur and the "service station" attendant. Introductory chapters explain the electric circuit, measurements of current, power, energy, etc. after which the description of the accumulator is led up to by a brief account of the primary cell. Explanations of the laws of electricity are followed by worked numerical examples. Next effects of charge and discharge are explained, and such phenomena as changes in specific gravity and in colour of plates, "gassing," and variations in P.D. discussed. A chapter is devoted to the explanation of capacity, after which the chief parts of the modern accumulator are described. In doing so the author refers particularly to special forms of batteries, such as those used on motor-cars or for wireless work. The second half of the book is devoted to methods of charging and hints on the maintenance and repair of cells. The information is of a practical character, and is assisted by numerous illustrations. The attempt to furnish suitable information both to the amateur and the attendant with some technical knowledge naturally presents some difficulties. The early part of the book would probably be too elementary for a trained man, whilst much of the latter part might be too deep for an amateur. However, readers may be expected to select information according to their needs.

COLOUR MUSIC; THE ART OF LIGHT; *by Major Adrian Bernard Klein, M.B.E.*

This is the title of what promises to be a most interesting work, of which a subscription edition is being prepared by Messrs. Crosby, Lockwood & Son. Major Klein will be known to our readers as a leading expert on applications of coloured light, and he has several times addressed the Illuminating Engineering Society on this subject. Major Klein summarizes progress in colour music from the 18th century onwards, and the book should be of interest to many members of the Society. Advance orders will be met immediately on publication at the special price of 28s. 6d. a copy; but the selling price after publication will be 36s. net.

PHOTOMETRY

BY

JOHN W. T. WALSH

M.A. (Oxon.), M.Sc. (Lond.), A.M.I.E.E., F.Inst.P.

Member of the National Illumination Committee of Great Britain; General Secretary of the International Commission on Illumination.

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INDEX (November, 1926).

EDITORIAL NOTES :—
The Opening Meeting of the Illuminating Engineering Society—Illuminating Engineering Abroad—The "Efficiency" of Lighting Installations ... 311

NOTES AND NEWS ON ILLUMINATION 313

NEWS FROM ABROAD 314

TECHNICAL SECTION :—
Transactions of the Illuminating Engineering Society (Founded in London, 1909):
Account of Opening Meeting on October 26th ... 315
A Summary of Progress During the Vacation by L. Gaster 315
Progress in Electric Lighting (Report of the Committee on Progress in Electric Lamps and Lighting Appliances) 317
Progress in Illuminating Engineering (Report presented at the Twentieth Convention of the American Illuminating Engineering Society) ... 321
Industrial Fatigue Research Board, Sixth Annual Report 323
Some Remarks on "Efficiency" of Illumination, by N. Halbertsma 324
Dutch Illuminating Engineering Society: Visit to Düsseldorf 325
Sheffield Illumination Society 326
Arterial Roads: Night Traffic and Lighting Requirements 326

POPULAR AND TRADE SECTION :—
The Lighting of the Home 327
Scottish Electric Lighting Service Bureau 330
E.D.A. Conferences during 1926-27 330
A New Process of Paving Roadways 330
The Lighting of a Greyhound Coursing Track ... 330
Lighting the Village Darkness 330
Sheffield Illumination Society 331
Women's Engineering Society: Autumn Programme 331
Opening of Kensington (Church Street) Showrooms of the Gas Light and Coke Co. 331
The Duke and Duchess of York at Granton Gasworks 332
A Modern Artificial Sunlight Exhibit 334

TRADE NOTES AND ANNOUNCEMENTS :—
An Interesting Street-lighting Unit—Illuminating Engineering and the Contractor—Hailglassware—The New Metro-Vick House in Glasgow—Shop-Window Lighting—Domestic Lighting Units—Developments in Mercury-Vapour Lamps, etc. ... 336

REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED :—
Accumulator Charging, Maintenance and Repair—Colour Music: The Art of Light 341

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